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SOME RECENT DEVELOPMENTS IN THE DAIRYING INDUSTRY OF THE UNITED STATES.

Address given before the Annual Conference of Butter Factory Managers, Melbourne, May, 1919.

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During the past twenty years the dairying industry of the United States has made great progress, and the yearly value of its dairy produce is now estimated at £200,000,000.

Though during the period mentioned the total number of cattle in the country has shown no increase, the number of dairy cows has greatly increased, and to-day exceeds 20,000,000.

The profits from dairying have been materially increased during the past decade, partly as a result of the consuming demand of the rapidly increasing population, and partly as the result of increased efficiency of dairy production.

This increased efficiency in dairy production has been brought about by the intensive educational propaganda carried out by well-equipped agricultural colleges and experiment stations in each of the forty-eight States of the Union and the activity of the many associations organized for the advancement of the dairy industry, such as the Herd Improvement Associations, Co-operative Cow Testing Associations, and the numerous Cattle Breeders' Associations throughout the Union.

I wish to confine my remarks to a few features of fundamental importance to all dairy interests, namely (1) recent developments in feeding and breeding of dairy cattle; (2) the work of the Cow Testing Associations; (3) the educational and investigational work done in the United States in the interests of the dairying industry.

Feeding of Dairy Cattle.

The visitor accustomed to the conditions prevailing in the Australian dairying districts is much impressed by the buildings and plant on the

average American dairy farm. As he travels through the Middle-Western and North Eastern States of the Union, innumerable large cattle barns and towering silos constantly meet the eye. The first impression one gets is that the American farmer builds much larger barns, and lays by a much greater store by hay, silage, and other food-stuffs, than the Australian farmer. On inquiry, it is learned that these barns are built, not only as milking sheds, but to house the stock during the long, freezingly cold winter months; that the high roofs are filled with hay and other roughage for feeding the cattle, and to serve as an emergency food supply; and that the towering silos contain corn silage to provide a sufficient reserve of succulent fodder for feeding throughout the year.

The freezing winter climate compels the American dairy farmer to house his stock all through the winter and to provide ahead large reserves of succulent fodder and clover, lucerne, or timothy hay. But he has found that this liberal winter feeding leads to greatly increased milk production, and that the milk yields under these artificial conditions often equal the production in spring and summer, when the best natural pastures are available.

Thus, hand-feeding of stock, at first necessitated in winter by the rigorous climate, is now becoming a fairly general practice throughout the year. Indeed, hand-feeding is carried out to an extent which would astonish the average dairy farmer of Victoria. Not only are the cows heavily fed during the winter months, but even when the cows are grazing on good pastures their pasturage is frequently supplemented by hay and concentrates.

The objective of the progressive dairy farmer appears to be (1) to raise on his farm the maximum amount of grain, hay, and fodder; (2) to retain these food products on the farm for feeding his stock during the year; (3) to feed his cattle with as much hay and silage as they will eat, and to supplement the ration of the higher-yielding cows with grain and concentrates; and (4) to keep only the best-yielding cows and systematically cull the worst.

The basal ration for a 1,000-lb. cow is 35 lbs. silage and 15 lbs. hay (clover), timothy, or lucerne. But investigations at the experiment stations have shown that even if high-producing cows are fed with an abundance of hay and silage, the maximum yield of milk cannot be obtained without the addition of some grain or concentrates to the ration.

Cows like the Holstein, capable of giving from 5 to 6 gallons per day, will not be able to yield these quantities of milk if fed only on hay and silage, because their bulk is too considerable. Hence the usual practice is to supplement these quantities of hay and silage with 1 lb. of mixed grain or concentrates for every 3 to 4 lbs. of milk, according to its quality. American dairy farmers are beginning to realize that the successful feeding of dairy cows from an economic stand-point involves the providing of an abundant supply of palatable, nutritious feed at the minimum cost per unit of feed, and supplying it to the cow in such a way as to secure the largest production for the feed consumed.

For successful milk production two things are necessary—a productive dairy cow and a liberal system of feeding. A good cow may produce well for some time even on poor feed, but she does this at the expense

of her own body. Unless she is properly and liberally fed she must yield less milk than she is really capable of giving, and finally dry off when the stores of nutrients in her body are depleted.

The dairy cow may be regarded as a mere milk-making machine. A certain proportion of the power furnished to any machine is used for running the machine itself, and is not in any sense productive. In a steam engine this is represented in the exhaust steam, in heat which escapes without producing steam, and in friction of the working parts of the engine. In the manufacturing plant it is represented by the managerial, clerical, and sales force. These forces, while necessary for the successful operation of the business, are in a sense unproductive.

In the dairy cow this overhead expense, this unproductive force, is termed the maintenance ration, and is that portion of the feed given the cow which is used by her to perform her own functions, such as heating the body, pumping the blood, digesting the feed, and moving from place to place. This feed, from a productive stand-point, is entirely lost to the farmer. The cow can produce without loss of body weight only after she has exacted this toll of maintenance. All the food she consumes above this can be used for milk production. The maintenance ration is a fixed charge, and the more feed a cow can consume above that required for maintenance, the greater the amount available for production.

Feeding for profit can, therefore, be defined as liberal feeding, or feeding to the full capacity of the cow.

One of the common mistakes in the feeding of dairy cattle is that the good cows are not fed a sufficient quantity of feed above that required for maintenance. This is especially true of the highly-specialized dairy cow—that is, the cow which, when fed all she will take, makes it into milk, except the portion needed for maintenance.

A good dairy cow in full milk expends as much energy as a horse at hard work, and she should not be expected to get all her feed from what might be termed roughage, such as hay and silage, or even pasture. How much concentrates (bran, gluten feed, brewers' grains, &c.) to feed is a question of great economic importance to dairymen, for in most cases hay, pasture, and silage are cheap, and concentrates the costly part of the ration.

The amount of concentrates to be fed depends on—(*a*) the quantity and quality of the roughages; (*b*) the productive capacity of the cow. For the most economic production and the largest profit cows of good dairy temperament, when in full milk, generally receive at least from 6 to 8 lbs. of concentrates in addition to all the legume hay and corn silage they will consume.

COWS SHOULD BE FED AS INDIVIDUALS.

One important fact has resulted from the numerous dairying investigations at the experiment stations—that the requirements of the cows should be studied individually. Even when liberally fed, cows of marked dairy temperament rarely lay on flesh when in full flow of milk, provided their ration is well balanced. Since even in well-bred and well-selected herds the different cows vary widely in productive ability, to secure the most profit they must be fed as individuals, instead of giving both high and low producers the same ration.

From the results of numerous feeding trials which have been conducted, the following feeding formula has been developed. In practice it has given very satisfactory results:—

(1) Under normal circumstances the cow should be fed all the hay, silage, or roughage that she will eat up clean.

(2) The grain or concentrate ration should be adjusted to the milk production.

(3) The grain or concentrates should be fed in the proportion of 1 lb. to each 3 lbs. of milk produced, except in the case of cows giving over 4 gallons, in which case 1 lb. of grain should be given for each 4 lbs. of milk. A better plan is to give 1 lb. of concentrates each day for every pound of butter fat that the cow produces during the week.

(4) Feed all that the cow will respond to in milk production. If she begins to put on flesh, cut down the grain ration.

BREEDING OF DAIRY CATTLE.

One important lesson forced on the visitor to America is the recognition of the value placed by American breeders on outstanding animals for the improvement of their dairy herds. High producing cows or bulls from dams with high milking records sell for what would be regarded here as fabulous prices. Last year a six-months-old bull was sold for over £20,000. Pure-bred animals with a good milk production record, which would realize perhaps a few hundred guineas in Australia, would bring several thousands in the States. As I shall attempt to show, the enormous prices paid for animals of outstanding merit are, in many cases, justifiable.

Breeding of high-class dairy cattle is both a science and an art. Until recent years it was merely an art. But fundamental studies in the principles of heredity have increased the proportion of science, and the future cattle-breeders will use more scientific principles than the breeders who have preceded them. Dairy cattle-breeding may be grouped under two heads—(1) Breed improvement; (2) herd improvement. The individual dairyman is, of course, most interested in herd improvement. His chief concern is to secure a greater return from his cattle for the labour he expends. In the long run, whatever makes for herd improvement must react for permanent breed improvement.

The outstanding breed improvements are usually due to great strides made by master breeders in their own herd improvement.

According to Galton's law, one half of the characteristics of the individual come from the male and his ancestors, and the other half from the female and her ancestors. Since, in most herds, only one bull is used, and he is mated with all the cows, one half of all the characteristics of the heifers that are raised come from the sire. This has resulted in the well known and popular statement that the sire is half the herd. The facts are that certain excellent sires are more than half the herd; likewise, certain extremely poor ones are more than half the herd. In other words, they are pre-potent sires, either for good or for bad.

One of the best illustrations of this simple fact is furnished by a study of the Jersey herd at the University of Missouri. This herd was established from four registered Jersey cows in 1884, and a herd bull

known as Missouri Rioter. Since then the herd has not been increased by the purchase of females, and new blood has been introduced only by the purchase of bulls. For the past 26 years complete milk and butter-fat records have been kept for each cow in the herd.

The records of the progeny of three bulls used in this herd are interesting. In the case of Missouri Rioter 3rd, the actual increase which he gave to each of his daughters over their dams was 323 gallons of milk and 156 lbs. of butter-fat yearly, as shown in the following table:—

TABLE SHOWING PERFORMANCE OF PROGENY OF MISSOURI RIOTER 3RD AS COMPARED WITH THEIR DAMS.

	Dams.	Daughters.
Average yield of milk (gallons)	477.5	800.5
Average per cent. of fat (lbs.)	4.97	4.8
Average yield of fat per cow (lbs.)	238	384

On the other hand, the progeny of Missouri Rioter, the father of Missouri Rioter 3rd, showed a decrease in milk yield of 99 gallons, and of fat 18 lbs., as compared with their dams.

Another bull—Brown Bessie's Register—proved to be an even greater detriment to the herd. His progeny gave an average yield of 174 gallons less milk and 76 lbs. less fat than the average yield of their dams.

These are interesting cases, illustrating in a remarkable way the influence of good and bad bulls on a herd of pure-bred Jerseys. These records are the more valuable because they have been kept continuously for over a quarter of a century.

They show, too, the importance of using a tested bull to improve a herd. By a tested bull is meant one that has daughters that are in milk.

High class tested bulls and high producing cows are relatively few in number. When such bulls have been discovered, they can greatly improve the herds even of common or grade cows. In every famous herd the success may be attributed to sires of outstanding merit. The influence of a good sire on the milk records of his progeny is so great as to warrant the dairyman placing an extremely high value on his services.

IMPROVEMENTS IN SCRUB HERDS.

One of the most important investigations on the subject of improvement of common herds by the use of tested bulls which came under my notice were those undertaken by the Iowa Agricultural Experiment Station.

The great mass of dairymen cannot afford to establish pure-bred herds. There are not enough pure-bred animals to go round. They can, however, purchase one good sire. The object of the Iowa investigation was to determine the influence of a pure-bred dairy sire in increasing the production from a foundation herd of scrub cows.

Scrub cows from an isolated and backward region of Arkansas were selected as a foundation herd. These scrub cows were mated with

pure-bred sires, and the milking records of the daughters and granddaughters of these scrub cows were compared with those of their dams.

Seven scrub cows, four heifers, and two heifer calves were selected as a foundation herd for this investigation, which was commenced in 1907. The animals were very inferior, being small, with limited abdominal, udder, and vein capacity, and very unprepossessing as far as quality and top lines were concerned. The illustrations are more expressive than words in conveying a true impression of the type of cattle used at the beginning of the experiment.

Pure-bred Guernsey, Jersey, and Holstein sires were used on these scrub cows, and all the heifer calves and the progeny of these heifer calves were raised under similar conditions.

The following table summarizes the results of two generations of breeding with pure-bred bulls:—

IOWA STATE COLLEGE DAIRY FARM.

INCREASING THE PRODUCTION OF SCRUB HERD.

Table I.

AVERAGE PRODUCTION OF SCRUBS AND FIRST AND SECOND GENERATION CROSSES.

Bull Used.	Dams.		Daughters.		Granddaughters.	
	Milk.	Fat.	Milk.	Fat.	Milk.	Fat.
	galls	lbs.	galls.	lbs.	galls.	lbs.
Guernsey	416·8	186	463·4	218	709·1	355
Holstein	325·5	161	631·1	261	1129·5	431
Jersey	390·3	186	540	287	547·9	291

Table II.

PERCENTAGE INCREASE IN PRODUCTION OF CROSSES OVER SCRUBS.

Bull Used.	First Generation.		Second Generation.	
	Milk.	Fat.	Milk.	Fat.
	%	%	%	%
Guernsey	11	17	70	91
Holstein	94	62	245	168
Jersey	39	54	40	56
Average	45	39	110	102

It will be seen that the first generation females proved to be very much superior to their dams in production, and thus clearly demonstrated the value of a pure-bred dairy sire as an investment for a common or scrub herd, as well as for a high-grade or pure-bred herd.

There was a great improvement in constitution, capacity, mammary development, straightness of top line, quality, and type. This improvement is still more marked in the second generation grades.

I. What Feeding Will Do For Scrub Cows.

1

Scrub Cow No. 6.

Her production the first year after her arrival at the Iowa College was 2,742 lbs. milk and 131 lbs. butter-fat.

2

Same Scrub Cow after three years on Iowa College Farm.

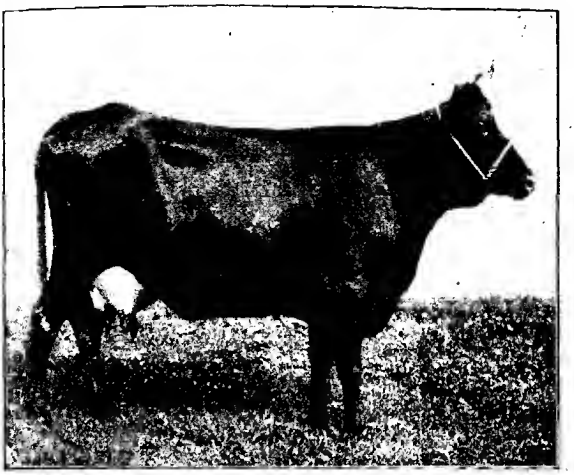
Production, 5,556 lbs. milk and 244.8 lbs. butter-fat—an increase of over 100 lbs. butter-fat due to good feeding.

II. What Breeding Will Do For a Foundation Herd of Scrub Cows.

1

Scrub Cow 33.

Production, 4,916 lbs. milk and 205 lbs. butter-fat in one year.



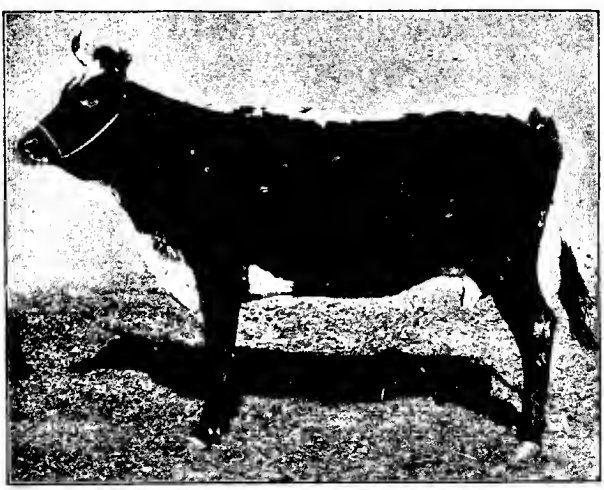
2

Daughter of Scrub Cow 33 by pure-bred Guernsey Sire.
Production, 5,716 lbs. milk and 258 lbs. butter-fat.

3

Grand-daughter of Scrub Cow 33 by pure-bred Guernsey Sire.
First lactation (only one completed so far), 7,091 lbs. milk and 355 lbs. butter-fat.

III. What Breeding Will Do For a Foundation Herd of Scrub Cows.



1

Scrub Cow 56.

Average production during three lactations, 3,742 lbs. milk and 187 lbs. butter-fat.
Highest production, 5,237 lbs. milk and 266 lbs. fat.

2

Daughter of Scrub Cow 56 by pure-bred Holstein Sire

Average production for six lactations, 6,471 lbs. milk and 247 lbs. butter-fat. Highest production, 9,136 lbs. milk and 338 lbs. butter-fat.

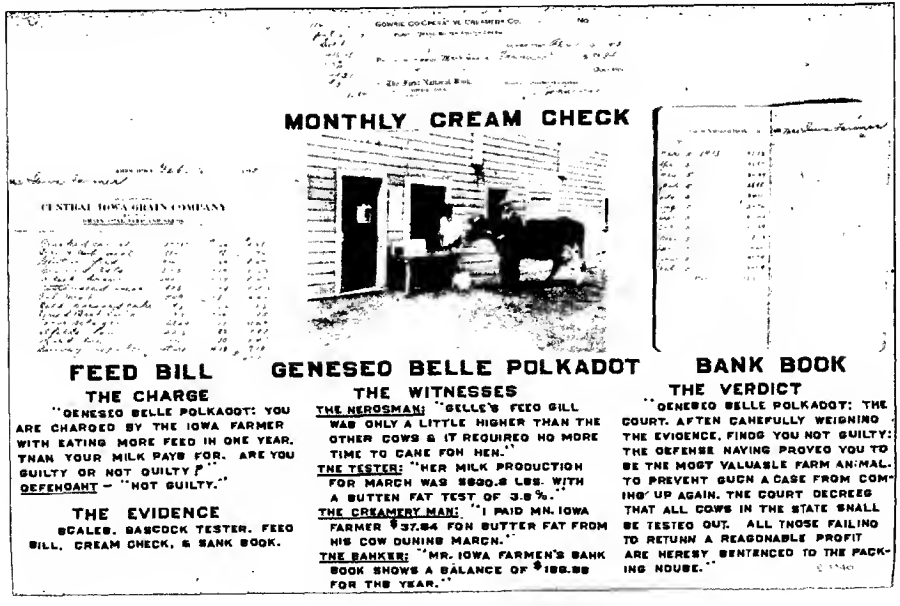
3

Grand-daughter of Scrub Cow 56 by pure-bred Holstein Sire.

Production on first lactation (only one complete so far), 11,295 lbs. milk and 431 lbs. butter-fat.

IV. Cow Testing.—The Dairy Cow on Trial.

Showing the use of scales, Babcock test, the feed bill and the cream cheque in detecting "boarder" cows.



The results briefly were that the first generation crossbred progeny showed an increase of 45 per cent. in milk yield and 39 per cent. in fat over their scrub mothers, and the second generation progeny showed an increase of 110 per cent. of milk and 102 per cent. in fat. The greatest advance was shown with the Holstein crosses. The second generation Holstein progeny averaged 431 lbs. butter-fat, as compared with 161 lbs. for their scrub grand-mothers.

This investigation demonstrated that the average level of production of a common herd could be greatly raised by the use of a pure-bred tested sire.

Cow Testing.

The third method of improving the dairy stock of a country is the use of systematic cow testing to eliminate the "boarder cows," and to discover the best cows from a milk-production stand-point, to use for breeding purposes.

Since there is a great variation in the production of individuals of the same breed, and since many individuals revert to the production of the original cow, or nearly so, it is necessary to keep records of each cow to discover and dispose of those that are unprofitable. It does not pay to keep "boarder" cows in the herd. They reduce profits and increase the cost of production.

Intelligent selection and breeding can only be done by a study of the performance of individual cows. To find the "boarders" requires that careful records should be kept of milk produced, its quality, and the food eaten. Where such cow testing is done by groups of dairymen working in co-operation, the best results are obtained. The first Cow Testing Association was organized in America in 1905. Since then hundreds of Associations in all parts of the Union have been organized.

The usual cost of co-operative herd testing in the United States is 6s. to 8s. per cow. The best results are usually obtained when a tester supervises 25 or 26 herds of 20 to 30 cows each. The success of the Association largely depends on the tester. He should be of good personality, congenial temperament, tactful, trustworthy, and know how to make up suitable rations. He must know how to test accurately for butter-fat, and be able to keep correct accounts. He should be of much benefit to farmers in suggesting systems of feeding and management.

The tester arrives at the first farm on his list usually before the evening milking. He weighs both the grain and the roughage given to each cow and the milk produced by each cow. These weights are recorded, and a sample of milk is taken and put away for the following morning. The next morning he weighs the feed and milk again, takes another sample of milk, and tests the two samples. The data are then recorded, and the records of production for the day, as well as amounts of feed given, are written up for the farmer.

The tester makes suggestions as to feeding, and gives whatever other assistance may be indicated as valuable by the results of his observations.

With this record of production and feed of one day repeated each month, the tester, at the end of the year, can supply complete information about each cow. The amount of milk and fat produced in the year, the amount of food eaten, its cost, and returns from each animal are computed, and the profit and loss on each cow determined. Printed records are supplied for this purpose by the Association.

RESULTS OF COW TESTING.

The improvement wrought by the Co-operative Herd Testing Associations has been remarkable. The first association in the United States was organized in Michigan in 1905. During the first eight years the average yield of butter-fat per cow in the association's herds was increased from 231.1 to 284.7, and the average net returns over cost of feed were more than doubled.

Through the establishment by the Dairy Breeders' Association of advanced registers for pure-bred cows, a great improvement has resulted. Cows are entitled to advanced registry only when their yields in tests conducted by representatives of State Experiment Stations, or of Breeders' Associations, have reached a standard set by the association.

Entry in these registers increases the money value, not only of the given cow, but also of her relatives, for progressive breeders in buying animals now rely more and more on records of production and less upon show-ring successes.

Even in the leading dairy States it is estimated that probably one-fourth of the dairy cows fail to pay for their care and feed, due chiefly to the fact that their owners do not know which return a profit and which are "boarders."

Even experts are often unable to tell from appearance alone whether a cow is profitable or not.

Herd testing alone can determine exactly what each cow produces. Herd testing gives the breeder an opportunity for making great advances in raising the standard of production of his herd.

Through skilled breeding, based on herd performance records, combined with expert feeding, remarkable records of production have been obtained in the United States.

Duchess Skylark Ormsby, a pure-bred Holstein, holds the world's record for butter-fat, with a production of 1,205.1 lbs., and 2,776 gallons of milk, in a year.

The world's records for milk production are held by Tilly Alcartra, a Holstein, giving 3,045 gallons of milk, and Zarilda Clothilde 3rd De Kol, giving 3,047 gallons.

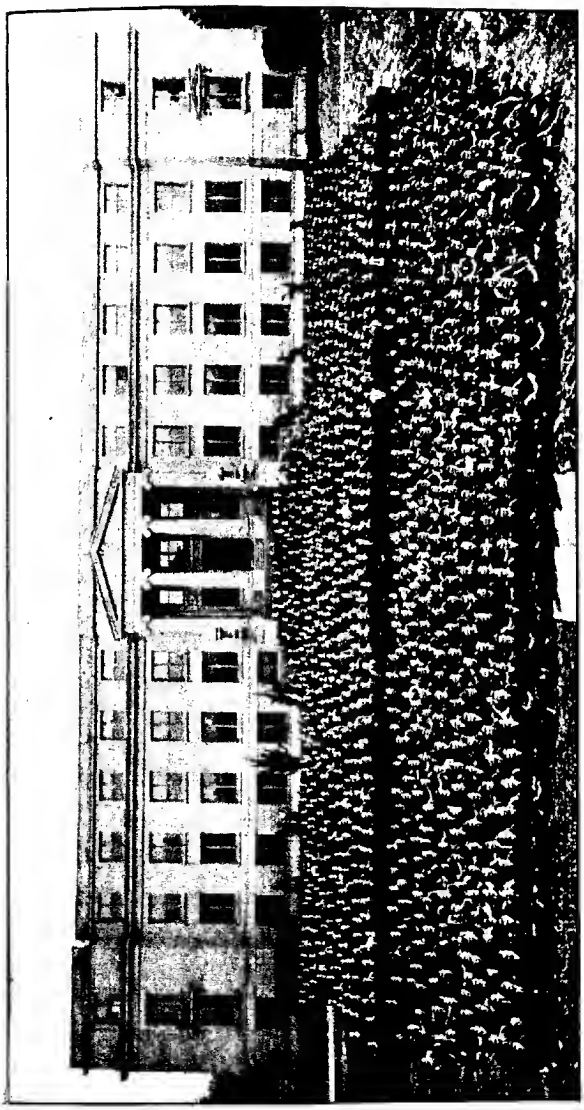
The best Guernsey cow in the United States is Murne Cowan, which produced, at eight years of age, a record of 2,400 gallons of milk, and 1,098 lbs. of butter fat.

The best Jersey cows, Sophie 19, produced, at seven years, 1,755 gallons of milk and 999 lbs. of butter-fat, and Sophies Agness 1,621.2 gallons and 1,000.7 lbs. butter fat.

The best Ayrshire, Lily of Willowmoor, produced 2,259 gallons of milk and 955 lbs. of butter-fat.

These records would have been considered impossible of achievement twenty years ago, and had it not been for the widespread use of herd testing, combined with the use of tested bulls from prolific dams, it is doubtful whether the standard of production could have been raised to the high levels of the present day; nor would the public have heard of many of these fine cows.

Despite the fact that at the present time there are cows in the United States averaging over 8 gallons of milk per day throughout the year, and yielding 3½ lbs. of butter-fat per day throughout the year, the limit of production has not yet been reached.



Group of Agricultural Students at Iowa State College of Agriculture, Ames, Iowa.

The dairy cow is a more efficient machine than the steam engine. A cow producing 1 lb. of butter-fat a day uses about 47 per cent. of her food for the support of her body, 24 per cent. in the work of converting food nutrients into milk, and actually yields in her milk 29 per cent. of the digestible nutrients in her feed.

Herd testing, scientific breeding, and expert feeding may result in the evolution of a race of "super-cows," which will be as efficient in the conversion of nutrients into milk, compared with ordinary cows, as the Diesel engine is to the ordinary steam engine in efficiency. It is probable that if careful records were made of the production of cows in Victoria, we would find that one-third of the dairy cattle do not pay for their feed and labour expended on them, one-third would pay expenses, while the remaining one-third would be found to yield the profits that accrue to the dairy industry. If this be true, then the dairyman of Victoria would be better off if one-third of the cows—representing the unprofitable section—were slaughtered to-morrow. Herd testing is the medium by means of which the weeding-out process can be effected.

Barn for Experimental Feeding of Dairy Cattle at the Iowa Agricultural Experiment Station.

Those who are interested in Victoria's dairy welfare should exert every ounce of strength to see that Cow Testing Associations, properly conducted, are organized without delay, and that the present system of herd testing for pure-bred herds is extended.

Dairy Education.

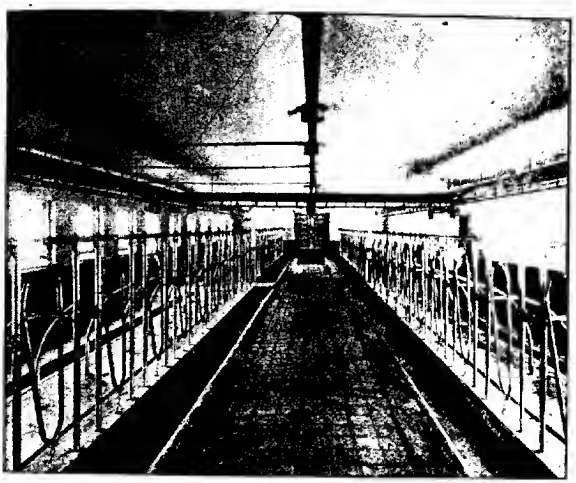
The people of the United States are interested in all forms of education, but on none do they spend money more freely than on agricultural education. They hold that an efficient system of education is a necessity for national progress. They contend, too, that money wisely spent on agricultural education is a national investment, which is repaid to the country many times over in the form of increased material prosperity.

Americans have the reputation of being a business-like and practical nation, requiring a dollar's worth of result for every dollar of expenditure. Yet, on agricultural education, investigation, and extension work,

the nation spends £12,000,000 per annum. But primary production has been increasing at the rate of £90,000,000 per annum during the last fifteen years, so that these large sums of money spent on agricultural instruction have been returned many times over in the form of increased primary production.

The chief educational agencies are—(1) an Agricultural College of University grade in each State of the Union; (2) a well-equipped State Agricultural Experiment Station, staffed with high-class scientific workers; (3) a Federal Department of Agriculture, working in the very closest co-operation with the State Agricultural Colleges and Experiment Stations.

These organizations perform three functions—(1) Instructional work in all phases of agriculture; (2) investigation work; (3) publicity or extension work in all departments.



Interior View of Cow Barn, Indiana.

In every Agricultural College and Experiment Station there is a Department of Dairying. In some colleges, *e.g.*, the University of Wisconsin, some of the foremost dairy specialists of the world are on the staff, *e.g.*, Dr. Babcock, the Agricultural Chemist who discovered the Babcock test; Henry and Morrison, the great authorities on foods and feeding.

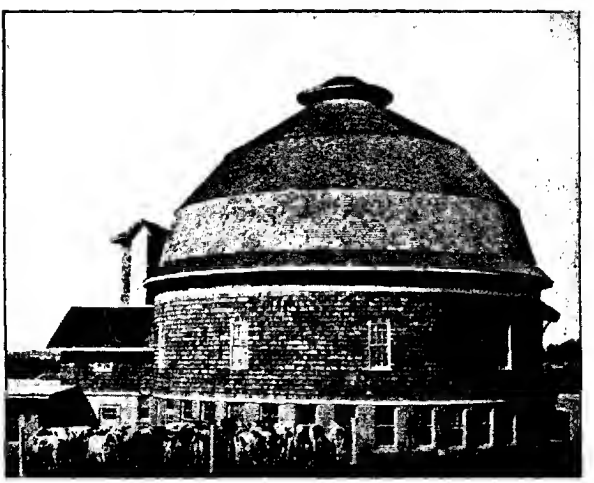
Discoveries at the Wisconsin Experiment Station.

Some idea of what well-equipped colleges and experiment stations have done for the dairy interests of the State may be seen from the record of achievement of the Wisconsin Experiment Station.

It is demonstrable that the added wealth of the State of Wisconsin each year, as a result of the activities of the Experiment Station, is

many times the whole appropriation made by Wisconsin for all forms of agricultural education.

Of the seven tests widely used in dairying, six have originated or have been improved at the Wisconsin Station. The Babcock fat test, invented in 1890, furnished a simple means of paying for milk on the basis of quality and for detecting fraud. This test permits of a more careful control of factory processes than formerly, thus saving more than half of the fat formerly lost in the skim milk produced in creamery operations. For Wisconsin alone this amounts to a saving of over 1,500,000 lbs. of butter. The greatest service of the Babcock fat test, however, has been in making possible the improvement of dairy cows by eliminating unprofitable animals, and thus giving a scientifically accurate foundation for dairying.



Circular Dairy Barn, Urbana, Illinois.

The Wisconsin curd test detects the quality of milk as to taints. The casein test, invented in 1909, registers the casein content, which is of importance in determining the proper value of milk for cheese making. The alkaline tablet test measures the acidity of milk. The moisture test readily determines the percentage of water in butter. The fundamental studies in cheese ripening resulted in the discovery of inherent milk enzymes and certain bacteria concerned in the production of cheese flavour.

These discoveries led to the perfecting of the new process of cold curing of cheese, which has revolutionized the method of ripening the cheddar product. The improvement in quality and the reduction of losses by shrinkage have led to the general adoption of this method in the United States and Canada. Here, again, is a case where practical

results of the highest commercial value have developed from a purely scientific and theoretical study of the causes involved in the ripening of cheese.

The lack of uniformity which characterizes the product of the average cheese factory is due primarily to the variable quality of the milk supply from different farms. An entirely new method, devised by the Wisconsin Station in 1909, of pasteurizing the milk for cheddar cheese making, bringing it to a standard degree of acidity, and adding a pure culture of bacteria, produces a more uniform product of better quality and increases the yield.

A new food product, perfected in 1910, utilizes butter milk—a factory by-product. Many creameries are now converting their butter-milk into this cheese.

The method of destroying disease-producing organisms without impairing the quality of milk and cream was worked out in 1905, since which time it has come into general use for the city milk supply trade.

Students Judging Stock at Ohio College of Agriculture.

The fundamental studies on the relation of heat to the destruction of disease bacteria, such as tuberculosis, laid the proper foundation for this important aspect of the city milk trade.

These tests and experiments made at the Experiment Station, which together form the most important contribution ever made to the science of dairying, and the work of the Wisconsin Dairy School, have enabled Wisconsin to gain the first rank among the States of the United States in the production of both cheese and butter.

Since the Babcock fat test was discovered, the value of the dairy products of Wisconsin has increased from £4,000,000 to £16,000,000 per annum, giving her first place among the States for output of dairy products—a position achieved despite many disadvantages. It cannot be doubted that a considerable percentage of this increase has been due to the campaign of investigation and education which has been carried on by the dairy school of the Experiment Station.

In addition to the output of dairy products, Wisconsin's cereal yield is considerable. Though less than two-thirds the size of Victoria, and though the northern half of the State is mostly poor land in need of drainage, Wisconsin, besides producing £16,000,000 worth of dairy products, raises 100,000,000 bushels of oats, 70,000,000 bushels of maize, and 25,000,000 bushels of barley.

The dairy industry of Victoria is capable of almost indefinite improvement. Our climatic and soil conditions are eminently suited for dairying. No other country—save, perhaps, New Zealand—has such a uniformly mild temperature, such an abundance of rich pastures, nor such natural conditions for the production of high-quality and high-grade dairy products. Yet our average production per cow does not compare favorably with countries which have poorer soil, climate, and pastures; nor can it be said that the quality of our products are what they might be.

With all the natural advantages we possess we should become one of the leading dairy States of the world. But before we can achieve this destiny, the handicaps to efficient production must be removed. Increased production per cow and increased efficiency in the handling of dairy products are vital factors for our progress. Increased production per cow may be effected through the triple pathways of better feeding methods, more attention to the use of high-grade sires, and the drastic weeding out of the unprofitable "cow boarder" by the formation of Cow Testing Associations, and the extension of the system of herd testing now in vogue for pure-bred herds in Victoria. Increased efficiency in handling and manufacturing dairy products may be brought about by providing facilities for dairy research work on the lines followed in the United States, and particularly in Wisconsin.

It is a somewhat extraordinary fact that there is no institution in Australia where the managers of butter factories and cheese factories may obtain the special technical training for their life's work, or where the managers might seek light on the many knotty technical problems which constantly present themselves, or where investigational work on the technical and manufacturing side of dairying is carried out.

Above all, there is urgent need for intense propaganda work for improved methods of production on the dairy farms of the State.

This is one of the problems of agricultural education, and I hope that the members of this Conference will use their influence to secure for the State a system of instructional, investigational, and extension work in keeping with the importance of the agricultural interests of Victoria.

REPORT ON THE EIGHTH VICTORIAN EGG-LAYING COMPETITIONS, 1918-19.

Conducted at the Burnley School of Primary Agriculture by the Department of Agriculture, Victoria.

A. Hart, Chief Poultry Expert.

Although no records were achieved in any of the egg-laying competitions for 1918-19, which concluded on the 31st March last, the average results obtained from the whole of the competing birds in both the individual and the team tests were very satisfactory. Of course, the establishment of records is of great interest, and the rearing of a 300-egg hen something to be desired. Yet, after all, it is the aggregate produce of the whole of the competing birds that indicates improvement in the quality of the flocks of the community, and the egg-production in the competition just closed indicates this.

The popularity of the tests is shown by the large number of entries, and this year many breeders were disappointed at not being included in the list of successful nominators.

Tests and Results.

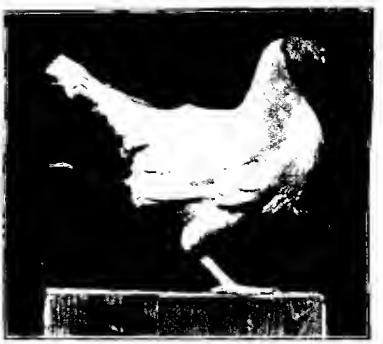
The eighty-two white leghorns in the single test laid an average of 208 eggs each, and the thirty-nine black orpingtons an average of 204. The wisdom of breeding from such birds needs no emphasizing. As an instance of the commercial value of birds that have "made good," it may be mentioned that £25 was offered and refused for a black orpington placed first in one of the competitions. In the individual dry-mash test for leghorns, Mr. Jack Ryan's bird laid the fine total of 306 eggs during the twelve months. This bird is of good type, nice size, and, considering her performance, was in good condition at the conclusion of the competitions. In the wet-mash single test for leghorns, Mr. McDonnell was successful with a hen of good body formation, rather tall, but, being out of feather at the conclusion of the test, it was difficult to judge her type. Her record was 285 eggs, a total that would undoubtedly have been increased but for her being well into moult before the end of the competitions.

In the single test for orpingtons (wet mash) Mr. P. Walker's winning bird was a good type that stood out for all-round quality She laid 294 eggs.

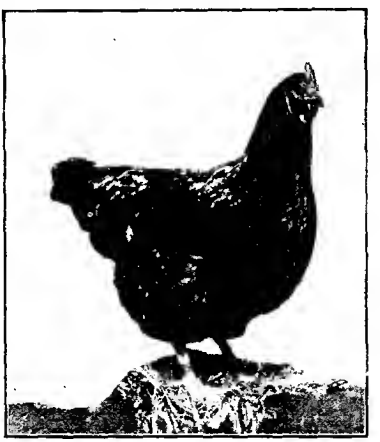
The competitors in the leghorn teams test (wet mash) were a uniform lot, showing good quality. They laid well through the period of the competitions, and the number of eggs laid by the winning pen, owned by Mr. G. Pocknall, was 1,511. In the dry-mash test for leghorns, Mr. W. H. Robbin's winning team laid 1,553 eggs. While this team was undoubtedly composed of good layers, I would have liked them a shade larger.

The black orpingtons placed first in the wet-mash section were from Hall's Egg Farm. They laid 1,306 eggs, and were birds of good all-round quality. Two pens in the dry-mash section for orpingtons—those of Mr. T. L. Eastaugh and the Marville Poultry Farm—tied for first place with a score of 1,285 eggs. They were birds of good type and size.

The grand total of eggs produced by the whole of the competitors during the twelve months was 12,290 dozen, which were sold at an average price of 1s. 3d. per dozen.



Mr. Jack Ryan's Winning White Leghorn in Individual Dry Mash Test.
Laid 306 eggs in twelve months.



Mr. Percy Walker's Black Orpington, placed First in Single Test for Orpingtons (Wet Mash).
Laid 294 eggs.

During the competitions there was a larger percentage of deaths than in previous years. This was due to some extent to the sudden changes in the weather affecting hens in the highest possible laying

conditions. As these birds were included in the laying computations and averages supplied, they cannot be compared on equal terms with other competitions, where the replacement of birds which die or become incapacitated in any way is allowed. The rule which was made debarring replacements has been found to give most satisfactory all-round results. It is, of course, hard for the individual

First Prize Winners—Leghorn Team Test (Wet Mash).
Laid 1,511 eggs. Owner, Mr. G. Pocknall.

First Prize Winners—Leghorn Team Test (Dry Mash).
Laid 1,553 eggs. Owner, Mr. W. H. Robbins.

owner, who has a team high up in the test, to suffer the misfortune of having his chance spoilt by the death of one or more of the competing birds. But if an extra bird were put in as a replacement, the credit of the year's egg-production must be given to seven instead of six birds. Exception has been taken to the rule, but only in very occasional cases.

Type Improving.

In inspecting the birds which competed in the 1918-19 tests, it was gratifying to find that very few weedy or undersized specimens were included. In white leghorns, the size showed an improvement, and type and general characteristics of the breed were more in evidence. The poultry breeders have evidently recognised the value of type, size, constitution, and have not had wholly in view the chances of egg-production. That they are right in their change of opinion goes without saying. Lacking size and constitution, it is practically impossible for a bird to produce either eggs of standard size or young birds which are suitable for breeding from.

Although an improvement can be noted in the birds which are competing in the 1919-20 test at Burnley, there is still room for a further advance in this direction. Competitors should avoid the inclusion of weak, under-sized, or badly-shaped birds in the breeding stock, and while

First Prize Winners—Test for Heavy Breeds (Wet Mash).
Laid 1,306 eggs. Owned by Hall's Egg Farm.

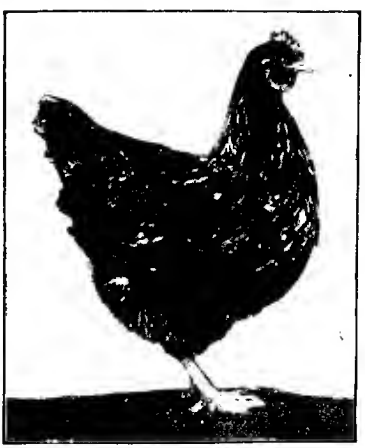
a bird with these faults may chance to be a prolific egg-producer, it is certainly not advisable to include her in the stud flock. If constitution, type, and size are neglected, it is only a matter of time when the utility or laying-strain birds will develop into weaklings of neither use nor ornament.

Feeding.

The cost of feeding the 750 birds for the year worked out at about 8s. 8d. each. The gross return from each bird averaged £1 0s. 5¾d, leaving a balance of 11s. 9¾d. over the cost of feeding. These figures from such a big number of birds must be regarded as very satisfactory, and, although the price of the food was high, the favorable average price of 1s. 3d. per dozen for eggs compensated for the extra expenditure.

The birds were all given a liberal allowance of food. It has been proved beyond doubt that if a bird is a prolific and regular egg-producer, she must also be a heavy feeder. For this reason the ration provided

was probably more than would have been given by many poultry-keepers. Although it is quite possible to give too much food to birds of the heavy varieties when in full egg-production, it is practically impossible to overfeed active and smart birds of the leghorn and other members of the Mediterranean family. After all, the birds are the best judges as to how much food they require, and if the attendant watches closely he will soon be able to regulate the quantity to allot to each pen with a degree of certainty—just giving as much as they will eat readily. It is essential that the ration should be varied according to climatic and other conditions. In cold weather, more food is needed to keep up the temperature of the bird, as well as to provide the necessary constituents for egg and flesh-forming. It is a well-known fact that considerable weight is attached by many poultry-breeders to the size and fullness of the crops of layers when they go to roost. If a bird has a large and well-filled crop,



Mr. J. W. Richards's Rhode Island Red, placed First in Test for Heavy Breeds other than Orpingtons (Wet Mash), with a total of 213 eggs.

the indication is that she is in full lay, and has provided herself with a plentiful supply of food for egg-forming, &c. But if the crop is soft, and only partly filled, it denotes that the bird is either "out of sorts" or is an indifferent layer. Of course, this is not an infallible guide, but it is correct in the majority of cases, and may be followed by breeders with good results.

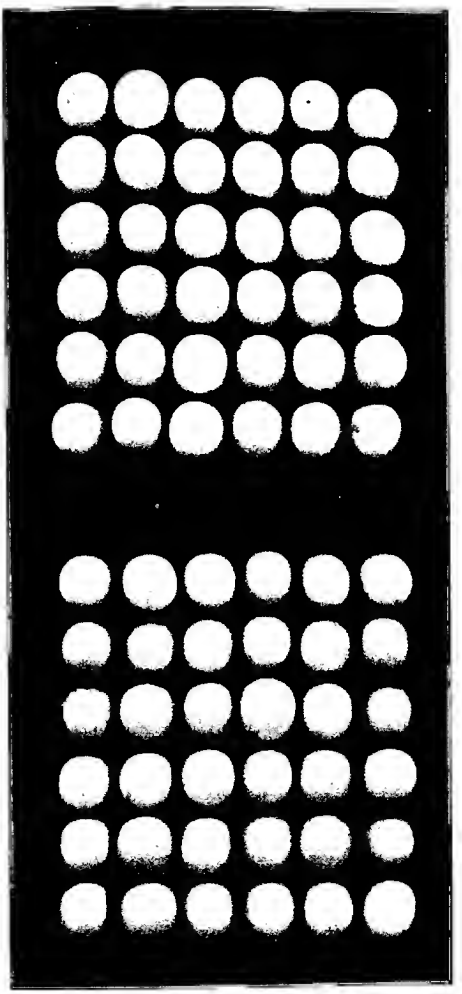
The system of feeding for the past twelve months was somewhat similar to previous years. The wet mash was composed of 1½ parts pollard, 1½ parts bran, ½ part of oaten pollard, ¼ part pea meal, and ⅓ part of meat meal. This was well mixed and moistened with meat soup or water. About 3 ozs. was allowed to each bird for the morning meal. The dry mash contained 1½ parts pollard, 2 parts bran, ½ part oaten pollard, ¼ part pea meal, and ⅓ part meat meal, with about 1 per

cent. of black or brown sugar. The grain ration for the evening meal comprised 3 parts wheat, 1 part oats, and ½ part maize. All of the above were allotted by measure, and about 2 ozs. of grain was allowed to each bird. When fresh meat was available, the meat meal was omitted from the mash. A very little salt was added to both wet and dry mashes.

Mr. T. L. Eastaugh's Pen of Black Orpingtons, which tied for First Place in Test for Heavy Breeds (Dry Mash)

Pen of Black Orpingtons, owned by Marville Poultry Farm, which tied for First Place in Test for Heavy Breeds (Dry Mash).
Laid 1,285 eggs.

Green stuff of various kinds was fed regularly and liberally. A full supply of green food, in my opinion, is one of the most necessary portions of a laying hen's daily diet. All birds should be given a little mash at midday. This will tend to increase egg-production. During the winter months the mash should always be given warm. Shell-grit,



Eggs Packed for Market.

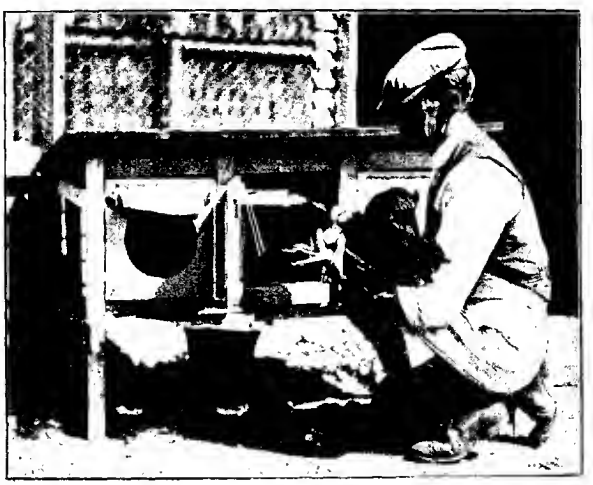
Mr. Jack Ryan's White Leghorn, in twelve months, laid 306 eggs.

Market value, at 1s. 3d. per dozen	£1	11	10½
Cost of food	0	8	8
Return after deducting cost of food	£1	3	2½

oyster shell, and charcoal were always within the reach of the birds, and a plentiful supply of pure and fresh water was at all times available.

Housing.

The housing of the teams of six birds does not include any elaborate or expensive constructions. The houses are roomy, well-ventilated, and there is plenty of yard accommodation for the occupants. The ground, being porous, absorbs the moisture quickly, and although heavy rain may fall for hours, no bad effects are caused. The single pens are constructed in rows, with the fronts facing towards the east. A passage is provided at the back of the pens, and the eggs are gathered and all feeding done from this passage. The pens are roomy, and although warm and

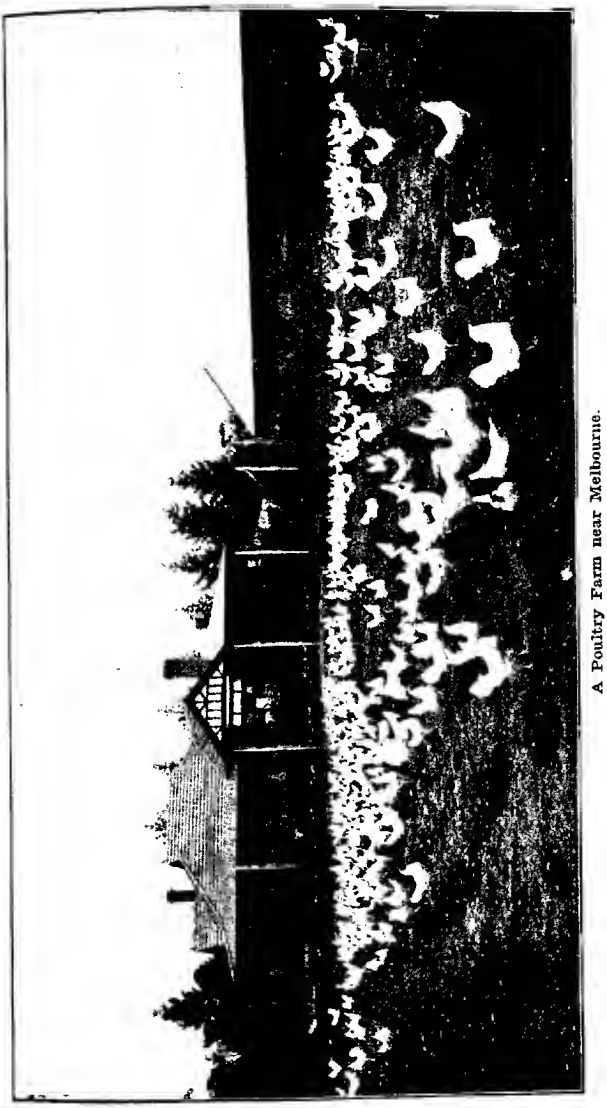


Recording Eggs under the Trap-nest System.

comfortable, there is plenty of ventilation for all the inmates. The partitions between the single pens are all composed of wire netting. This allows the birds to see each other, and induces them to settle down much better than if the partitions were closely boarded. The single-testing lines which have been adopted at Burnley have been approved by all the owners of the competing birds, and this may be considered a satisfactory proof of their suitability.

Does Poultry Farming Pay?

This question has been asked on many occasions, and although there may be some who assert it does not return a profit, I can safely state that, providing it is carried out on correct lines, and under the management of a capable person, poultry is certain to pay. As an



A Poultry Farm near Melbourne.

instance that it is a source of profit, I may mention that a poultry farmer within the suburban area, whose gross income from his poultry farm last year was nearly £1,000. He has only about 2 acres of land, and nearly one-half of that is taken up by the dwelling house, lawns, and garden. The amount mentioned does not include eggs sold for setting, or birds disposed of for stud purposes. This breeder left a permanent position to take up poultry farming on utility lines, and keeps only white leghorns of the very best strains. What can be done by one man can be done by others; and the great majority of failures in poultry keeping cannot be ascribed to the poultry, the man at the head of the business being generally responsible for the want of success. Many other cases could be cited where poultry keeping, both on utility as well as exhibition lines, has been carried on successfully for many years, and these facts must be accepted as a certain proof that poultry farming pays.

Undoubtedly the price obtainable for eggs in our Melbourne markets are not as high all through the year as they should be. But poultry keepers are themselves to some extent blameworthy for this state of affairs. Cool storage is available, yet very few poultry farmers avail themselves of this method of storing eggs when they are very plentiful, and prices consequently low. Until full advantage is taken of the opportunity that exists for placing surplus eggs in storage, prices will inevitably fall in that season of the year when eggs are abundant. Of course, it is argued that the trouble and expense involved in the transport of eggs to and from the cool store is such as to prevent poultry farmers from storing eggs, but if there were some co-operation among those in the same districts, this difficulty could be largely obviated.

The formation of a Co-operative Poultry Farmers Society has been suggested many times, and, notwithstanding all that would militate against such an organization in the very wide area over which it would operate, its establishment must come if our poultry industry is to be the success it should be.

At present a great many discharged soldiers are entering into the business of poultry rearing. This must further tend to bring about a glut of eggs at certain times. But there is an outlet for our prospective over-supply. England imports millions of pounds' worth of eggs every year, and imports them mostly at the time when prices here are low. Can we not secure a market there? Yes, but no individual poultry farmer can do so alone. Small parcels of eggs cannot be exported, for eggs need a separate chamber. To arrange for the shipment of eggs overseas, united action is essential, in order that the necessary space may be obtained and then filled. Therefore, the establishment of a co-operative society is an urgent question, for its formation would mean the salvation of a growing and what should be a thriving industry.

* * * * * * *

The competitions are still under the capable supervision of Mr. J. T. Macaulay, and he deserves every commendation for the manner in which he has carried out the many and arduous duties which pertain to the position he holds. His knowledge and experience have been useful on many

occasions, and the care and attention he gives to the stock, noting every change, and feeding in proportion to the indications given, have been instrumental in bringing about the improved average egg-production from the competing birds.

PRIZE LIST.

For the greatest total number of eggs laid by a pen in each Class of Sections "A" and "B":—

Section A.—Groups of Six Birds.

Class 1.—Light Breeds.—Wet Mash—

1st Prize, Champion Certificate: G. Pocknall.
2nd Prize, Government Certificate: Geo. White.
3rd Prize, Government Certificate: C. Ridley.

Class 2.—Light Breeds.—Dry Mash—

1st Prize, Champion Certificate: W. H. Robbins.
2nd Prize, Government Certificate: C. Ridley.
3rd Prize, Government Certificate: Braeside Poultry Farm (T. Milner).

Class 3.—Heavy Breeds.—Wet Mash—

1st Prize, Champion Certificate: Hall's Egg Farm.
2nd Prize, Government Certificate: F. C. S. Fredericksen.
3rd Prize, Government Certificate: L. McLean.

Class 4.—Heavy Breeds.—Dry Mash—

1st Prize, Champion Certificate: *Marville Poultry Farm (J. E. Bradley).
*T. L. Eastaugh.
3rd Prize, Government Certificate: J. C. Mickelburough.

Section B.—Individual Birds.

Class 1.—Leghorns.—Wet Mash—

1st Prize, Champion Certificate: G. McDonnell.
2nd Prize, Government Certificate: Montuna Poultry Farm (A. K. Luke).
3rd Prize, Government Certificate: H. W. Bond.

Class 2.—Leghorns.—Dry Mash—

1st Prize, Champion Certificate: Jack Ryan.
2nd Prize, Government Certificate: Mrs. S. M. Krakowski.
3rd Prize, Government Certificate: E. A. Underwood.

Class 3.—All Light Breeds other than Leghorns.—Wet Mash—

1st Prize, Champion Certificate: Mrs. G. R. Bald.
2nd Prize, Government Certificate: Mrs. G. R. Bald.
3rd Prize, Government Certificate: Angus and Gilliver.

Class 4.—Orphingtons, any colour.—Wet Mash—

1st Prize, Champion Certificate: Percy Walker.
2nd Prize, Government Certificate: C. Brown.
3rd Prize, Government Certificate: L. Garlick.

Class 5.—All Heavy Breeds other than Orphingtons.—Wet Mash—

1st Prize, Champion Certificate: J. W. Richards.
2nd Prize, Government Certificate: J. Mulgrove.
3rd Prize, Government Certificate: H. Stutterd.

* Equal.

For the greatest total number of eggs laid by a pen of light and heavy breeds during the first four months of the Competition, terminating on the evening of the 31st July (Winter Test):—

Section A.—Groups of Six Birds.

Light Breeds—

1st Prize, Champion Certificate: G. Pocknall.
2nd Prize, Government Certificate: C. Ridley.

Section B.—Individual Birds.

Light Breeds—

1st Prize, Champion Certificate: G. McDonnell.
2nd Prize, Government Certificate: *Miss N. B. Bruford.
*Mr. Jack Ryan.

Section A.—Groups of Six Birds.

Heavy Breeds—

1st Prize, Champion Certificate: T. L. Eastaugh.
2nd Prize, Government Certificate: Norman Bayles.

Section B.—Individual Birds.

Heavy Breeds—

1st Prize, Champion Certificate: C. Brown.
2nd Prize, Government Certificate: Percy Walker.

For the pen which attained the greatest average weight per dozen eggs laid:—

Section A.—Groups of Six Birds.

1st Prize, Government Certificate: T. H. Wakefield.

For the pen the eggs of which realized the highest market value throughout the competition:—

Section A.—Groups of Six Birds.

1st Prize, Government Certificate: G. Pocknall.

Section B.—Individual Birds.

1st Prize, Government Certificate: C. Brown.

* Equal

CONCLUSION OF TEST.

LIGHT BREEDS—WET MASH.

GROUP OF 6 BIRDS.

Owner.	Breed	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.	Position in Competition.
G. Pocknall	White Leghorns	128	131	119	129	128	132	141	125	136	118	107	117	1,511	1
Geo. White	" "	101	128	127	95	122	147	135	138	134	122	113	96	1,458	2
C. Ridley	" "	119	117	133	134	122	124	132	118	113	111	91	82	1,396	3
G. McDonnell	" "	76	69	80	124	137	139	147	141	128	119	112	93	1,367	4
E. A. Underwood	" "	79	95	80	97	138	127	140	131	120	134	108	93	1,352	5
R. Lecher	" "	93	101	117	121	135	131	144	132	118	119	98	98	1,337	6
N. B. Bruford (Miss)	" "	36	92	109	102	127	131	139	129	129	127	112	84	1,320	7
Thomas Shaw	" "	108	82	71	111	126	185	143	124	125	112	92	89	1,300	8
A. Chung	" "	56	123	102	114	130	126	136	114	120	124	80	81	1,306	9
J. Oudyke	" "	101	103	98	86	114	133	135	120	112	135	89	65	1,288	10
C. R. Barrett	" "	117	101	37	98	90	128	132	128	117	121	104	104	1,277	11
H. W. Bond	" "	43	58	106	139	127	127	141	113	102	95	75	51	1,267	12
H. Stevenson (Mrs.)	" "	101	98	67	95	133	140	146	126	111	108	71	51	1,247	13
C. Brown	" "	77	59	53	79	117	128	142	126	134	127	110	90	1,242	14
A. H. Mould	" "	8	81	102	89	111	122	132	127	131	129	108	84	1,223	15
W. G. Swift	" "	104	105	64	88	113	104	117	112	117	108	93	95	1,222	16
A. Lockwood (Mrs.)	" "	104	60	39	69	118	141	152	133	124	139	90	57	1,217	17
H. T. Mason	" "	111	105	86	98	110	125	130	110	101	109	74	56	1,201	18
R. W. McIntyre	" "	20	94	109	109	119	120	134	112	110	96	80	59	1,203	19
C. G. Viney (Mrs.)	" "	68	77	94	102	123	122	127	115	100	99	92	82	1,201	20
F. Gillet	" "	91	64	21	93	136	137	126	123	113	114	97	82	1,197	21
W. Witchell	" "	112	107	39	62	124	125	134	124	106	104	89	76	1,196	22
T. Wilson (Mrs.)	" "	63	71	67	67	121	125	134	131	123	118	95	66	1,182	23
William Liddell	" "	81	83	84	84	119	125	131	111	112	113	89	37	1,174	24
J. Douglas	" "	73	87	66	81	87	125	140	136	121	107	88	48	1,169	25
F. W. Brine	" "	44	83	117	101	98	122	136	114	105	101	81	48	1,150	26
G. H. Beck	" "	64	83	78	82	114	133	129	124	127	102	78	32	1,146	27
J. A. Carter	" "	97	31	52	119	120	124	119	111	105	103	81	76	1,143	28
H. Hanbury	" "	72	89	73	90	114	113	118	122	115	101	95	69	1,141	29
H. Miller	" "	61	66	69	85	139	133	128	107	97	97	85	69	1,136	30
G. S. Joyce	" "	19	43	110	107	80	153	129	116	113	106	87	72	1,126	31
W. M. Bayl s	" "	51	70	48	4	104	131	145	124	132	126	95	82	1,112	32
Brooklyn Poultry Farm	" "	44	97	80	36	103	120	123	120	107	99	69	106	1,104	33
F. C. Wilers	" "	62	95	54	87	122	120	124	113	98	98	79	52	1,104	34
J. J. West	" "	110	111	55	62	107	107	110	90	95	94	84	78	1,103	35
H. Hunt	" "	86	81	76	62	102	128	124	118	111	89	82	29	1,088	36
J. H. Treloar	" "	45	73	52	70	116	119	115	102	100	102	90	73	1,066	37
L. McLean	" "	3	29	89	100	111	113	124	120	106	117	95	66	1,064	38
T. A. Pettigrove	" "	95	97	91	73	104	111	100	84	87	76	67	56	1,041	39

LIGHT BREEDS—WET MASH—*continued*.

Owner.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.	Position in Competition.
H. S. Wood	White Leghorns ..	92	51	22	78	125	127	124	109	105	95	76	30	1,034	40
F. G. Bevis	" " ..	82	65	76	54	69	112	116	105	111	88	78	70	1,026	41
J. Hall (Mrs.)	" " ..	17	26	96	92	91	99	100	111	100	102	73	41	1,008	42
A. H. McKean	" " ..	58	97	34	84	101	109	124	99	08	77	77	40	908	43
Paramount Poultry Farm ..	" " ..	48	57	28	89	112	90	97	93	89	91	77	44	915	44
T. Rodda	" " ..	76	53	..	71	08	89	67	41	100	61	46	28	750	45
Total		3,276	3,812	3,303	3,982	5,177	5,570	5,773	5,258	5,016	4,820	3,954	3,089	53,120	

LIGHT BREEDS—DRY MASH.

GROUP OF 6 BIRDS.

W. H. Robbins	White Leghorns ..	66	102	124	139	136	135	156	149	144	142	124	136	1,553	1
C. Ridley	" " ..	70	143	68	139	144	140	149	139	138	131	103	112	1,476	2
Braeside Poultry Farm ..	" " ..	117	136	108	105	131	141	141	128	127	129	103	96	1,462	3
J. R. D. Jackson	" " ..	122	133	112	54	122	144	164	136	129	121	115	91	1,443	4
J. Ogilvie	" " ..	78	119	98	106	110	138	156	148	145	147	102	87	1,434	5
A. Enticknap	" " ..	08	102	101	126	133	135	144	138	131	108	97	97	1,410	6
B. Brown	" " ..	56	62	87	125	136	141	142	128	112	117	101	92	1,300	7
W. M. Bayles	" " ..	85	76	87	99	107	129	136	124	124	126	101	85	1,279	8
A. Chung	" " ..	89	30	100	135	122	136	131	142	130	124	103	94	1,277	9
N. B. Bruford (Miss) ..	" " ..	70	86	72	120	133	138	125	124	118	122	00	68	1,275	10
F. A. Underwood	" " ..	64	73	48	95	124	149	156	133	120	131	108	73	1,274	11
H. Hunt	" " ..	14	36	125	100	114	131	133	126	120	119	115	101	1,234	12
J. W. Wharton	" " ..	59	74	58	64	126	125	140	128	129	119	99	82	1,203	13
Rio Stud Poultry Farm ..	" " ..	60	103	111	85	96	115	122	114	107	116	97	77	1,202	14
J. B. Minshull	" " ..	50	27	79	96	92	123	142	139	129	120	100	113	1,200	15
W. Shepherd (Mrs.) ..	" " ..	68	79	82	89	125	137	129	132	104	110	84	51	1,190	16
Don Poultry Yards	" " ..	..	18	71	113	128	142	153	143	134	109	89	78	1,178	17
F. J. Johnson	" " ..	38	20	72	116	118	141	143	128	118	123	85	74	1,176	18
J. B. Nicoll (Mrs.) ..	" " ..	26	100	130	120	125	138	137	119	104	122	95	71	1,157	19
S. M. Krakowski (Mrs.) ..	" " ..	25	53	71	64	103	133	136	133	119	120	106	78	1,141	20
J. A. Carter	" " ..	37	78	46	73	123	119	126	121	115	114	101	72	1,125	21
W. J. Thom	" " ..	101	58	36	89	130	127	129	96	102	109	86	50	1,133	22
A. Slede and Sons	" " ..	45	25	19	92	137	135	145	117	117	113	87	70	1,102	23
A. H. McKean	" " ..	12	47	49	92	94	124	132	117	111	105	86	55	1,024	24
J. O. Tabuteau	" " ..	37	14	83	141	113	147	156	70	49	33	..	..	873	25
Total		1,402	1,720	2,007	2,577	3,062	3,363	3,523	3,172	2,976	2,939	2,386	1,994	31,101	

HEAVY BREEDS—WET MASH.

GROUP OF 6 BIRDS.

Owner.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.	Position in Competition.
Hall's Egg Farm	Black Orpingtons	94	117	110	125	113	127	130	112	105	93	87	93	1,306	1
F. C. S. Fredericksen	" "	79	84	105	120	147	123	118	126	97	118	71	91	1,288	2
L. McLean	" "	28	74	119	138	141	142	143	104	114	102	80	83	1,278	3
S. Buscumb	" "	112	64	81	105	143	135	128	107	93	102	85	70	1,230	4
Marville Poultry Farm	" "	90	102	110	118	139	141	133	116	87	68	71	46	1,221	5
C. F. Watts	" "	35	62	107	122	130	137	129	109	107	91	86	82	1,197	6
T. H. Wakefield	" "	65	107	116	118	111	113	125	98	107	101	67	63	1,191	7
A. F. Fox	" "	96	64	62	76	133	131	118	101	98	101	100	106	1,186	8
F. G Clamp	" "	82	93	79	120	137	129	112	57	98	75	73	82	1,139	9
A. Slede and Sons	" "	48	56	100	104	142	137	117	102	98	87	65	78	1,134	10
E. Griffiths	" "	50	44	79	100	96	133	119	111	120	101	76	96	1,125	11
C. G. Viney (Mrs.)	" "	56	41	67	105	122	134	119	108	99	100	57	67	1,075	12
J. B. Minshull	" "	6	47	68	117	122	132	111	110	100	100	90	72	1,075	
A. L. Bull	" "	24	58	97	97	124	109	116	09	96	95	66	00	1,071	14
H. Lawrance	" "	38	11	40	122	141	115	133	112	103	104	70	78	1,067	15
Oaklands Poultry Farm	" "	89	83	78	70	115	115	96	82	100	93	71	48	1,040	16
J. A. Drummond	" "	31	48	93	89	108	111	105	94	84	79	61	63	966	17
H. Stutterd	Rhode Island Reds	76	35	28	49	119	121	125	98	108	83	44	69	965	18
Norman Bayles	Black Orpingtons	80	116	127	132	103	86	88	70	41	41	32	45	961	19
T. W. Pearce (Mrs.)	" "	66	65	56	83	103	08	101	80	89	84	48	61	934	20
Total		1,245	1,371	1,722	2,119	2,489	2,469	2,376	1,996	1,949	1,811	1,419	1,483	22,449	

HEAVY BREEDS—DRY MASH.

GROUP OF 6 BIRDS.

Marville Poultry Farm	Black Orpingtons	44	83	122	130	120	121	127	128	109	110	97	96	1,285	1
T. L. Eastaugh	" "	93	139	141	127	133	133	113	92	88	81	70	75	1,285	
J. C. Micklethwaite	" "	35	126	67	117	143	135	132	111	107	107	92	91	1,263	3
A. Brundrett	" "	56	135	139	108	130	128	128	88	97	82	69	90	1,250	4
T. W. Pearce (Mrs.)	" "	48	117	111	111	128	129	118	90	102	78	55	64	1,151	5
R. R. Christie	" "	67	122	117	105	93	94	106	93	91	91	69	81	1,129	6
J. McAllan	" "	40	113	101	132	121	124	113	85	70	90	81	57	1,127	7
A. D. McLean	" "	14	87	97	108	99	124	117	100	90	49	72	62	1,019	8
Oaklands Poultry Farm	" "	78	72	96	94	85	76	75	71	50	67	70	35	869	9
J. Ogilvie	" "	50	41	89	121	102	88	79	58	67	55	48	46	844	10
Total		525	1,035	1,080	1,153	1,150	1,150	1,108	914	871	810	723	697	11,222	

LEGHORNS—WET MASH.

INDIVIDUAL BIRDS.

Owner.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.	Position in Competition.
G. McDonnell	White Leghorns	26	24	24	24	24	25	27	24	24	25	20	18	285	1
Montuna Poultry Farm	" "	24	22	23	22	23	25	27	27	26	25	21	17	280	2
H. W. Bond	" "	21	24	21	20	21	24	26	24	21	23	20	20	270	3
N. B. Bruford (Miss)	" "	27	25	22	23	24	23	24	23	21	23	18	13	265	4
D. N. Murray	" "	20	22	21	23	24	23	24	23	23	22	20	18	263	5
A. C. Nichols	" "	14	24	23	25	26	28	21	23	24	22	22	17	263	
J. H. Duncan	" "	22	17	10	21	23	24	27	24	22	22	21	10	261	7
A. J. Yarrow	" "	21	20	9	20	24	23	24	24	24	25	21	19	254	8
Brooklyn Poultry Farm	" "	10	22	21	25	23	25	24	24	21	21	17	16	240	9
J. H. Duncan	" "	4	. .	23	26	25	25	28	27	26	26	22	20	240	
G. McDonnell	" "	22	23	19	22	22	24	22	19	18	19	18	15	241	11
J. C. Mickelburough	" "	12	1	10	19	24	24	25	26	23	25	22	21	230	12
F. H. McKean	" "	3	22	20	22	24	26	26	24	22	26	10	13	238	13
G. Ochiltree	" "	20	20	19	22	23	23	19	19	19	17	19	18	238	
W. McDougall	" "	10	16	20	21	24	24	23	20	22	21	19	17	237	15
Montuna Poultry Farm	" "	22	20	20	21	25	24	21	18	19	18	16	16	235	16
Percy Walker	" "	6	. .	14	23	24	25	25	25	25	24	22	22	235	
A. H. Loones	" "	10	12	18	20	23	24	24	22	22	21	19	18	232	18
J. C. Mickelburough	" "	17	20	19	19	21	19	21	20	20	20	17	18	232	
F. G. O'Bree	" "	17	21	20	22	25	24	26	22	20	19	15	. .	231	20
C. Brown	" "	21	22	23	19	24	23	24	23	20	14	6	12	230	21
W. M. Bayles	" "	21	22	17	. .	17	23	26	23	24	21	19	15	228	22
C. C. Dunn	" "	19	21	20	17	. .	22	21	21	21	21	20	17	225	23
Bambra Poultry Farm	" "	16	. .	18	26	17	25	23	22	23	25	21	9	225	
E. W. Hippe	" "	20	17	19	22	22	24	25	15	14	18	14	12	220	25
R. Higgins	" "	17	17	6	16	19	22	23	22	21	21	15	17	219	26
C. H. Busst	" "	17	14	17	19	21	21	23	19	19	18	15	16	210	
A. C. Nichols	" "	. .	. .	5	22	25	25	24	24	25	24	22	21	217	28
R. Berry	" "	22	25	22	21	22	16	25	24	26	20	. .	. .	217	
R. Berry	" "	21	20	17	19	23	25	27	23	18	17	10	5	215	30
N. B. Bruford (Miss)	" "	3	5	21	22	23	23	24	21	23	22	17	8	214	31
A. J. Yarrow	" "	12	18	16	6	19	24	25	23	23	21	14	12	213	32
A. H. McKean	" "	18	18	20	20	17	25	19	14	20	20	14	8	213	
W. M. Bayles	" "	1	13	16	9	22	21	26	25	22	22	18	18	213	
G. Ochiltree	" "	1	17	19	20	23	20	23	16	17	19	18	16	209	35
A. Dicker	" "	. .	11	19	22	22	24	25	19	19	15	12	18	207	36
R. Higgins	" "	8	17	20	19	21	22	20	19	17	19	16	7	205	37
A. Slede and Sons	" "	13	20	21	19	22	18	22	13	16	20	6	14	204	38
D. N. Murray	" "	18	1	. .	21	20	22	24	23	23	23	17	10	202	39
Bambra Poultry Farm	" "	10	3	5	22	23	24	26	25	24	18	7	6	201	40
W. H. Thomas	" "	17	20	18	16	20	19	20	21	19	12	12	5	199	41
C. Brown	" "	16	. .	. .	1	23	23	26	25	25	24	12	13	199	
E. W. Hippe	" "	12	13	4	21	24	23	24	21	21	21	7	6	197	43
S. Yates (Mrs.)	" "	19	. .	5	26	25	23	21	24	17	17	7	5	189	44

LEGHORNS—WET MASH—*continued.*

Owner	Breed	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.	Position in Competition.
C. H. Busst	White Leghorns	9	14	14	...	9	21	23	20	20	17	16	17	180	45
C. C. Dunn	" "	21	...	4	17	7	20	25	26	24	20	8	20	179	46
Brooklyn Poultry Farm	" "	7	19	13	13	20	18	12	19	11	14	13	13	177	47
W. McDougall	" "	12	16	15	19	18	19	16	8	14	13	12	13	175	48
F. G. O'Bree	" "	18	24	19	14	..	21	21	18	15	6	12	6	174	49
A. Stede and Sons	" "	..	..	..	13	16	20	22	21	21	21	20	18	172	50
A. H. Loomes	" "	11	6	..	..	20	23	23	17	15	18	17	18	168	51
H. McKenzie and son	" "	18	21	19	11	15	20	17	11	8	4	12	5	161	52
A. Dicker	" "	1	14	12	13	16	19	17	12	12	11	13	13	153	53
W. H. Thomas	" "	..	..	..	..	18	22	22	20	19	17	1	..	119	54
Percy Walker	" "	..	..	14	22	15	23	16	..	..	..	..	..	90	55
H. W. Bond	" "	22	23	15	12	2	..	..	1	..	..	..	..	77	56
H. McKenzie	" "	..	..	..	..	..	..	..	..	..	..	..	..	..	57
S. Yates (Mrs.)	" "	..	..	..	..	..	..	..	..	..	..	..	..	..	
Total		759	806	867	991	1,117	1,241	1,275	1,142	1,090	1,052	826	729	11,895	

LEGHORNS—DRY MASH.

INDIVIDUAL BIRDS.

Jack Ryan	White Leghorns	11	28	30	28	27	25	28	26	26	25	23	24	306	1
S. M. Krakowski (Mrs.)	" "	21	24	22	22	24	26	30	27	26	24	23	23	296	2
E. A. Underwood	" "	23	27	20	22	25	24	26	25	27	19	24	16	279	3
S. M. Krakowski (Mrs.)	" "	14	27	22	21	25	24	27	25	26	25	21	2	305	4
Jack Ryan	" "	..	21	25	24	25	27	27	25	27	8	24	18	245	5
J. W. Wharton	" "	16	12	18	23	23	23	26	24	25	24	20	16	250	6
W. J. Thom	" "	18	21	20	5	10	22	25	24	25	23	24	20	237	7
A. Dicker	" "	14	22	21	19	21	22	25	22	23	22	18	15	234	8
Norman Bayles	" "	9	21	17	18	21	23	26	23	23	22	20	9	233	9
H. Merrick	" "	..	8	22	19	14	23	25	24	23	23	20	21	222	10
H. Merrick	" "	2	9	23	21	19	22	24	24	25	21	21	9	220	11
A. Chung	" "	13	20	26	24	21	18	17	18	14	17	15	10	219	12
A. Stede and Sons	" "	20	4	..	18	21	22	24	22	24	22	20	19	217	13
E. A. Underwood	" "	10	22	17	10	22	23	24	14	23	17	16	11	213	14
A. Dicker	" "	24	23	22	21	23	17	23	15	20	3	9	12	212	15
A. Chung	" "	24	9	11	20	20	20	18	10	19	14	19	7	200	16
N. Burston	" "	4	..	10	16	25	25	26	24	23	16	11	7	187	17
J. B. Nicoll (Mrs.)	" "	14	15	19	17	16	19	19	18	18	8	6	11	190	18
Norman Bayles	" "	..	..	16	19	20	21	20	17	19	8	17	15	172	19
J. W. Wharton	" "	..	..	..	18	21	22	22	23	25	23	4	..	157	20
N. Burston	" "	5	..	..	7	9	14	23	24	26	21	16	16	155	21
J. B. Nicoll (Mrs.)	" "	13	18	..	..	10	21	21	10	14	13	11	9	142	22
A. Stede and Sons	" "	7	11	7	11	14	16	16	12	14	10	13	11	142	
W. J. Thom	" "	10	14	20	19	17	20	18	15	8	..	..	..	141	24
Total		278	359	390	425	471	520	562	501	521	397	389	298	5,111	

LIGHT BREEDS OTHER THAN LEGHORNS—WET MASH.

INDIVIDUAL BIRDS.

Owner.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.	Position in Competition.
G. R. Bald (Mrs.)	Ancona	11	19	6	..	17	20	22	19	18	19	17	15	183	1
G. R. Bald (Mrs.)	,,	17	19	18	20	23	23	21	17	14	..	..	..	172	2
Angus and Gilliver	Minorca	..	14	19	7	22	22	22	19	19	15	..	..	159	3
Augus and Gilliver	,,	3	19	18	12	21	20	19	13	12	11	6	..	154	4
H. and S. Hart	,,	..	10	12	1	17	20	23	15	20	18	1	..	137	5
H. and S. Hart	,,	..	..	..	12	10	17	24	20	8	4	..	..	95	6
Total		31	81	73	52	110	122	131	103	91	67	24	15	900	

ORPINGTONS, ANY COLOUR—WET MASH.

INDIVIDUAL BIRDS.

Percy Walker	Black Orpingtons	26	27	26	26	27	28	20	23	25	26	15	16	294	1
C. Brown	,,	22	30	29	25	27	29	25	24	18	20	15	21	288	2
L. Garlick	,,	19	21	24	25	23	26	26	26	24	24	21	25	282	3
J. C. Mickelburough	,,	25	28	13	26	27	26	26	24	23	12	15	24	269	4
M. Whitley	,,	27	20	19	28	30	28	24	1	17	22	22	23	261	5
A. L. Bull	,,	18	21	23	..	23	27	29	26	27	25	21	20	260	6
M. Whitley	,,	27	24	24	29	19	29	20	26	3	25	9	30	256	7
C. Brown	,,	20	28	26	14	25	22	22	21	18	23	19	15	253	8
J. C. Mickelburough	,,	26	21	22	24	18	20	22	21	18	23	18	17	250	9
C. A. James	,,	25	21	27	25	25	24	27	14	15	8	18	11	240	10
C. E. Graham	,,	21	24	24	23	24	25	20	17	26	10	16	8	238	11
J. Ogilvie	,,	24	24	15	23	25	23	18	17	18	15	15	20	237	12
C. A. James	,,	23	26	24	18	22	25	22	16	15	18	9	17	235	13
Brooklyn Poultry Farm	,,	21	25	24	24	25	21	23	18	11	14	16	9	221	14
D. Fisher	,,	18	23	22	22	21	22	21	11	18	16	16	16	228	15
L. McLean	,,	14	20	19	10	21	28	24	22	21	19	13	10	221	16
C. E. Graham	,,	23	18	6	18	21	13	19	18	21	22	22	17	218	17
L. Garlick	,,	22	18	9	7	10	21	26	22	19	21	19	19	213	18
A. L. Bull	,,	13	19	9	25	24	25	19	22	21	17	11	6	211	19
Marville Poultry Farm	,,	21	23	22	22	25	23	22	10	3	8	11	17	210	20
E. K. Archer	,,	14	19	23	21	25	26	20	18	19	5	10	8	209	21
G. E. Kingswell	,,	14	16	9	9	7	25	28	29	13	24	10	25	209	
A. C. Nichols	,,	7	20	20	20	23	21	22	19	20	14	5	15	206	23
T. W. Pearce (Mrs.)	,,	12	6	15	4	22	25	25	27	26	18	19	15	204	24
S. Buscumb	,,	17	17	17	24	24	15	16	22	17	12	12	11	204	
D. Fisher	,,	22	23	21	15	16	17	15	16	11	22	15	9	202	26
E. K. Archer	,,	8	20	23	11	15	23	12	21	12	10	19	20	194	27
Brooklyn Poultry Farm	,,	12	4	1	2	14	26	15	15	23	24	10	24	194	

ORPINGTONS, ANY COLOUR—WET MASH—*continued.*

Owner.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.	Position in Competition.
R. J. Burroughs	Black Orpingtons	24	24	6	18	17	21	17	15	11	18	1	13	185	29
Percy Walker	" "	7	20	21	19	22	16	17	13	11	15	11	13	185	
A. C. Nichols	" "	15	21	..	7	25	25	15	14	24	..	6	25	177	31
R. J. Burroughs	" "	..	19	21	14	18	21	16	11	13	14	9	12	168	32
S. Buscumb	" "	13	23	19	17	28	18	12	12	12	6	9	6	165	33
T. W. Pearce (Mrs.)	" "	18	6	5	20	16	22	14	9	14	7	3	..	134	34
J. Ogilvie	" "	24	21	17	21	14	16	12	3	1	..	..	..	129	35
Oaklands Poultry Farm	" "	16	14	18	10	11	24	18	1	3	..	..	1	126	36
G. E. Kingswell	" "	8	9	5	1	7	8	16	6	17	9	12	8	106	37
L. McLean	" "	20	22	..	..	..	..	..	..	..	..	..	..	42	38
Oaklands Poultry Farm	" "	1	14	..	..	..	..	..	..	..	..	..	..	15	39
Marville Poultry Farm	" "	..	..	..	..	..	..	..	..	..	..	..	..	..	40
Total ..		689	807	618	669	769	828	759	630	609	574	462	535	7,949	

HEAVY BREEDS OTHER THAN ORPINGTONS—WET MASH.

INDIVIDUAL BIRDS.

J. W. Richards	Rhode Island Reds	10	23	21	23	23	26	23	20	23	15	18	18	243	1
J. Mulgrove	" "	14	21	16	15	23	26	22	25	20	22	17	15	235	2
H. Stutterd	" "	24	23	25	26	26	22	26	13	20	1	17	10	233	3
J. Mulgrove	" "	20	24	20	21	20	22	24	18	19	17	9	17	230	4
McCormack and Kinzell	" "	20	23	22	18	25	25	24	16	15	13	9	19	229	5
A. and F. Angus	" "	5	24	25	24	6	19	25	25	24	8	19	24	228	6
G. H. O'Bree	" "	16	22	22	9	24	25	26	24	23	13	7	11	221	7
W. E. Boyes	" "	10	24	22	22	26	25	25	21	19	8	16	7	216	8
G. H. O'Bree	" "	25	27	28	24	22	19	18	15	8	..	14	7	207	9
McCormack and Kinzell	" "	23	25	20	19	..	20	22	14	18	18	9	7	195	10
W. E. Boyes	" "	1	4	22	21	25	24	21	19	16	15	11	9	188	11
Dowdell's Poultry Farm	" "	..	..	17	26	24	16	22	14	15	18	18	18	188	
J. W. Richards	" "	12	19	16	11	10	19	24	17	15	15	14	11	183	13
A. and F. Angus	" "	7	15	21	18	16	22	19	16	16	10	6	6	172	14
L. Skipworth	" "	15	18	..	20	14	17	16	18	17	14	5	14	168	15
W. Calder	" "	4	18	21	20	21	21	19	14	..	..	..	..	138	16
Dowdell's Poultry Farm	" "	1	..	4	21	20	23	22	25	12	3	5	1	137	17
L. Skipworth	" "	19	25	23	20	21	13	8	..	..	..	..	..	129	18
W. Calder	" "	..	..	..	..	4	15	17	19	18	12	..	18	106	19
H. Stutterd	" "	18	9	13	20	12	11	..	..	..	..	..	..	83	20
Total		248	344	358	378	362	413	402	342	287	262	184	209	3,724	

THE AUSTRALIAN FLORA FROM AN ORNAMENTAL ASPECT.

(*By Edward E. Pescott, F.L.S., F.R.H.S., Pomologist.*)

(Continued from page 245.)

The Acacias or Wattles.

The popularity of the wattle has increased almost a thousandfold since the Wattle Day League sprang into potential and popular existence. Prior to the League's inauguration the wattles in cultivation were few, and on the first Wattle Day celebration in Melbourne in 1911 a census of wattle species displayed totalled thirteen. A few years later, on Wattle Day, 1917, a total of thirty-three wattle blossom species were counted. Seedsmen's lists now number wattles by the score, where previously only a dozen or so were noted. A census of Australian wattles

Golden Wattle (*Acacia pycnantha*).

reveals the presence of some hundreds of species, and as botanical exploration is being extended, particularly in the Northern Territory, many more are being added to the list each year; so that, counting the species and their many varieties, there must be over 500 different species and varieties native to Australia.

Generally speaking, the many species of the Genus Acacia have been included under the common term "wattle." This word has come to us from very early Anglo-Saxon history, when the pliant twigs and saplings of trees and shrubs were woven or plaited together to form framework for fences, hurdles, screens, and even buildings. The operation was called "wattling."

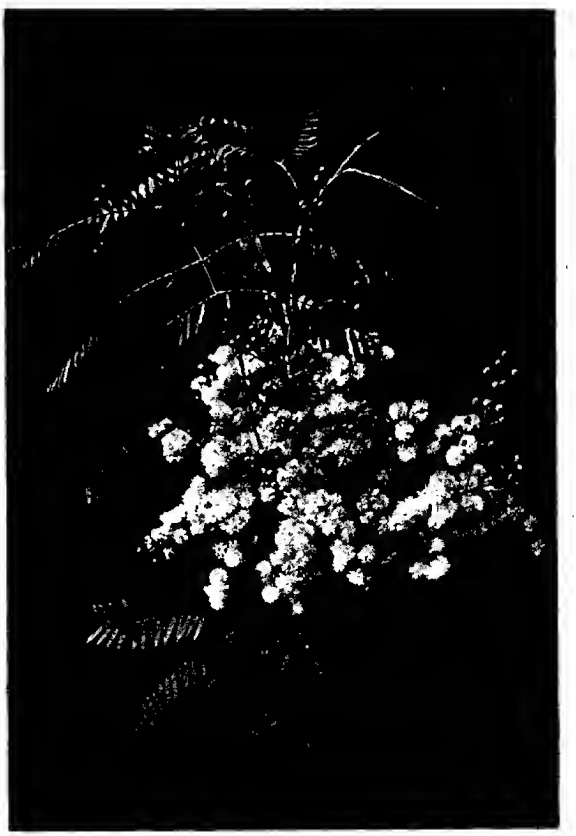
In the early history of Sydney, the settlers extensively carried out the work of wattling, not at first with acacias, but with the flexible stems of the native tree called Callicoma. Later the stems of acacias were used, and the term "wattle" has gradually become extended, so

The Beautiful Wattle (*Acacia pulchella*).

that it has applied to almost every species of acacia. The few exceptions are those which are called hickory, mulga, brigalow, wirilda, myall, and similar names.

It is now proposed, however, by the Plant Names Committee of the Field Naturalists' Club of Victoria to confine the use of the word wattle exclusively to those plants within the genus, which have been used, or which are capable of being used for wattling.

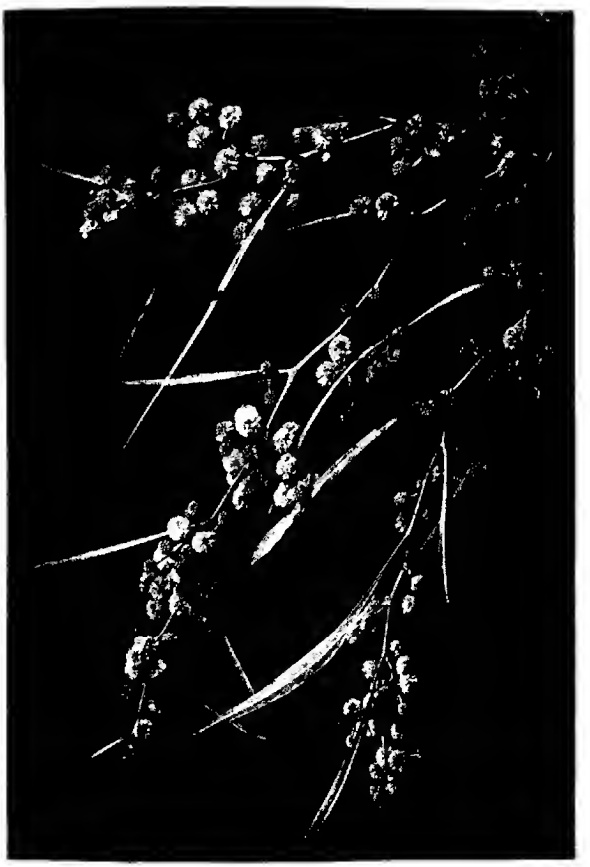
Writing on this question, Mr. J. H. Maiden, F.R.S., the Government Botanist for New South Wales, says, "Acacias are universally known in Australia as wattles, or prefaced by such adjectives as silver, golden, black, green. They also bear such names as myall, boree, mulga, cooba, dead finish, gidgee, hickory, umbrella bush, wait-a-while, and yarran."



Frosty Wattle (*Acacia pruinosa*).

Wattles range from low straggling herbs to giant trees; with foliage less than a quarter of an inch to 17 inches in length; the flowers of the different kinds ranging from pure white to the deepest shades of yellow and orange. There are wattles flowering in every month of the year, and one species, *Acacia retinodes*, is in flower almost throughout the

year. In regard to foliage, wattles naturally resolve themselves into two groups, one with true foliage, which is generally bipinnate or feather-like in character, and the other which possesses phyllodes, or flattened leaf stalks, but which very much resemble leaves in character. Then, again, the flowers form two separate groups, one in which the



Willow Wattle of Western Australia (*Acacia saligna*).

flower heads are round or globular, as in the golden wattle, *Acacia pycnantha*, or in long cylindrical spikes, as in the sallow acacia, *Acacia longifolia*. The characteristic variation of foliage is very interesting. One variety, from the Northern Territory, has leaves which have measured 17 inches long by 9 inches broad. The golden

wattle, *Acacia pycnantha*, produces large leaves in cultivation. The foliage of both of these wattles is very like that of a large eucalypt. *Acacia elata*, the cedar wattle, has bold pinnate foliage, like a very much enlarged pepper tree leaf. Some of the acacias have a notably glaucous or blue-green colour of foliage, and are thus very suitable for foliage colour schemes in the shrub or tree garden. *Acacia podalariæfolia*, the Queensland silver or Mount Morgan wattle, *Acacia Baileyana* the Cootamundra wattle, *Acacia cultriformis*, the knife-leaved wattle, *Acacia dealbata*, the silver wattle, *Acacia pravissima*, the Ovens wattle and *Acacia vestita*, the hairy wattle, all possess this valuable characteristic.

It has been mentioned that the genus Acacia is very variable as to size; and it is this characteristic that brings the wattle within the range of every gardener, so that specimens may be planted in garden borders, in the shrubberies, as hedges, and in the tree sections or parks. Thus *Acacia myrtifolia* is a low-growing shrub, so is *Acacia vestita;* the Sunshine wattle, *Acacia discolor*, is another; then *Acacia spectabilis, Acacia podalariæfolia, Acacia longifolia, Acacia dodonæfolia*, are somewhat larger; while *Acacia Baileyana, Acacia melanoxylon*, and *Acacia elata* quickly become trees.

In the matter of soils, the wattles are very accommodating; they will grow in almost any soil, provided it is not crudely rich, nor overcharged with animal manure. They will thrive in a poor soil, a loamy soil, or any soil in which the animal manure has been long and thoroughly decomposed. A peaty or leaf-mould soil suits them very well.

It is not wise, at any time, to give them crude animal manure. A small amount of chemical manure, such as bonedust, superphosphate, or blood manure is not objectionable. These facts are emphasized, because where wattles are grown in mixed garden beds or borders, manuring of all kinds is carried out, and stable manure is the common fertilizer used. When that is the case, it will be well to keep the manure away from the butts and roots of the wattles. Myrtle acacia, *Acacia myrtifolia* particularly resents stable manure, so does *Acacia stricta*. I have seen the foliage of the latter become quite golden as a result of manuring with animal manure. The bush remained so for a couple of seasons, and then died. The golden wattle, *Acacia pycnantha*, which is perhaps our most glorious wattle, will not take animal manure at all. This species also protests against excessive watering, particularly in summer. I have seen well-nourished, vigorous trees, trees 10 and 12 feet in height, die in a few days in summer, as a result of over-watering.

When one considers that the natural habitat of this species is on the hard, dry, stony hills, all over Australia, and it is not at all a denizen of the cool, moist valleys, its protest against excessive moisture is not to be wondered at.

Most of the wattles grow naturally under hard, dry conditions, and to force them with either manure or water, or both, in garden soils, is to create quick-growing, weak plants, which will neither thrive nor live for any period, nor give general satisfaction. So that an average amount of water, particularly in summer time, will give far the best results.

(To be continued.)

RECLAMATION OF WASTE LANDS.

By E. W. Murphy, Dairy Supervisor.

The reclamation of heath lands is a subject of interest to the people of Portland. A fine object-lesson is to be gained by a visit to Mr. W. J. Williamson's 400-acre holding, alongside the railway siding called Heathmere, 10 miles north of Portland.

Persons familiar with waste heath lands would be greatly surprised to see the crops of turnips, six or seven of which are sometimes sufficient to fill a flour sack, grown at Heathmere. Many tons of them have been distributed throughout the State, and some have been sent as far as Sydney. Notwithstanding their size, the texture and general good quality is astonishing. The flavour is excellent, and they have not that bitter nip common to many turnips.

In clearing the heath country it is first rolled with a Mallee roller pulled by six or eight horses, so that the scrub will wither sufficiently for burning. After burning, the land is ploughed with double-furrow stump-jump discs. It is then left for a number of months, and again rolled to break down the clods and level off the first ploughing. A second ploughing follows, which is done in a direction diagonally across the first furrows. It has been found that the decay of the root fibres is promoted if the soil be reasonably compressed, and that the decaying matter has a good influence upon the growth of crops. This, according to Lipman, is partly explained by the fact that cellulose is decomposed by anærobic organisms, and the exclusion of air thus favours decay of the roots. In open heath soils oxidation goes on too quickly, and the best class of organic matter becomes disintegrated and unavailable as plant food, but the fibres are not affected in this way, and so continue in evidence on the surface until they are covered and the soil compacted. This gives rise to the suggestion that it is not advisable to leave the first rough ploughing long in the open sods. Such is good practice for heavy lands, but the reverse is to be aimed at here. Tillage should proceed as soon as practicable until the land is effectively compacted. Subsequently it will be of the utmost importance for the settler to give special attention to this phase of his work to prevent the too rapid oxidation of humus, and loss by leaching out of the soil.

On Mr. Williamson's farm the soil is a loamy sand. Some of the higher levels are too sandy. A rotten ironstone outcrops in many places. When the scrub and root fibres are overcome, the land is easily worked. Rather less than 1 lb. of turnip seed, with 1 cwt. of superphosphate, is sown to the acre. The average rainfall during the period of growth is very favorable, but last season was very dry. The Purple Top Mammoth White does surprisingly well through the dry spells, and at Portland it has this decided advantage over the swede—it is not troubled by aphis.

Last season 25 acres were sown with turnips, and the accompanying photograph will give some idea of the results. At the end of June 220 lambing ewes were put on a portion, about 8 acres, which was fenced off. Later they were grazed on the balance of the crop, while another lot of 90 sheep was placed on the 8-acre plot.

Mr. Williamson has made every effort to ascertain the variety of turnip and potato best suited for the Heathmere soil and climate, and he has tried 20 sorts of turnips and 60 kinds of potatoes. From an early spring sowing the Early Wonder turnip stands out from the others. Sheep appear to prefer the leaves of the Purple Top Mammoth, and this alone makes it a variety deserving attention.

Very careful attention has been given to surface drainage, and a fine example set for the settlers to follow. The land has a good slope, is fairly even, and by means of a delver and horse team effective drains have been made very cheaply. Drainage is a very important part of the scheme for reclaiming the Portland heath land, and it could be carried out in the case of smaller holdings with light teams by co-operation.

Turnip Field at Heathmere.

Seventy acres are sown down in various grasses, which seem to be making fair headway. This year's sowing looks well, but the three-year-old fields are scarcely satisfactory. Experimenters should be careful not to overdo the search for a suitable grass. It is one thing to obtain a grass of exceptional root vigour and solvent and assimilative power, and another (and it must be guarded against) to obtain a grass which will grow luxuriantly, but which is lacking in some of the elements essential for the health of stock.

Hand in hand with the selection of plants must go the building up of a defective soil. In sandy soils plant foods go deep or wash out into the hollows or into the streams. If, after the growing of root crops, that are fed off, organic matter and minerals are supplied to the surface soils with light annual dressings of basic phosphate, a good sward can be developed.

CLOSER SETTLEMENT STUDIES.

THE PIG INDUSTRY AT ROCHESTER.

By R. C. Lorimer, Dairy Supervisor.

As an illustration of the rapid progress that has been made in the pig-raising industry on the irrigated closer settlements around Rochester, the following information may prove interesting:—Six years ago monthly pig sales were held at the Rochester Municipal Market, at which an average of about 30 fat pigs were yarded for sale. With the advance of settlement, however, the number submitted at monthly sales soon overtaxed the yarding accommodation, and it became necessary to hold fortnightly sales. This relieved the situation for some time, but the number of pigs coming forward continued to increase to such an extent that eventually weekly sales were held. Recently, however, the yards have been so overcrowded at weekly sales that it was evident more accommodation would have to be provided. Consequently, the council has now had the yards enlarged by the addition of 20 up-to-date new pens.

In addition to local sales, large consignments of fat pigs are forwarded fortnightly to the Western and Murray Co-operative Bacon Factory at Braybrook. The following figures, which have been prepared from accounts of sales kindly supplied by the local selling agents and the agent for the Co-operative Bacon Factory, show, approximately, the number and value of the fat pigs sold at Rochester during a recent period of ten successive weeks:—

Number of fat pigs sold	2,760
Average number per week	276
Total value realized	£8,791
Average value per pig	£3 3s. 8d.

From these figures it will be seen that the sales for the year would amount to about £45,000, and in this total no account has been taken of private sales.

The majority of these pigs have been bred and fattened on the irrigated closer settlement blocks within a radius of 12 miles of Rochester, where the mild and healthy climate has been found particularly suitable to the industry, there being an almost total absence of disease amongst pigs in this locality.

Combined with dairy farming, pig-raising has been found the most profitable way of utilizing the by-products of the dairy, while to those settlers who intend to become orchardists eventually, the pig has provided a ready source of income to tide over the period of waiting for the fruit trees to come into profitable bearing.

A few of the settlers engage almost wholly in the business, and have been fairly successful. The Berkshire, Large York, Middle York, and Tamworth breeds each have their advocates, and various crosses of these breeds are tried, with the object of obtaining a good type of bacon pig.

Pigs in the Rochester District thrive wonderfully well when grazed on lucerne, supplemented by a very light ration of pollard or skim milk. When approaching the marketable age, the pigs are penned up and topped off with a ration of pollard and grain. Pollard is the chief

food used, but the high price and difficulty in obtaining supplies of this product is turning the attention of pig-raisers to the necessity of growing more feed on the farms. Cape barley and maize can be grown fairly successfully, and if these two crops were more extensively cultivated, less dependence would have to be placed on the uncertain supplies of pollard. (Cape barley and maize, as pointed out by Mr. A. E. V. Richardson in the January number of the *Journal of Agriculture,* are largely used for bacon production in Canada and the United States of America.)

It is stated by those engaged in the industry that a net profit of 1s. per pig per week is a payable proposition, but usually the profit is higher, in some instances reaching 2s. 6d.

Successful pig-raisers realize that no animal will respond as quickly as the pig to cleanliness and good feeding, and the man who thinks that anything is good enough for the pig will sooner or later meet with disaster. Good, comfortable, and well-drained styes are essential to success, and for this purpose concrete is now being largely used in place of timber. It can be utilized in the walls, flooring, and feeding troughs in styes, and, where suitable sand is available, concrete forms a cheap, lasting, and serviceable building material. It will thus be seen that with a little encouragement in the shape of fair returns, pig-raising promises to develop into one of the staple industries of the northern irrigation settlements.

ALSATIAN POTASH.

Since the outbreak of war, potassic manures have been unobtainable at anything like reasonable prices. Stassfurth, which has so long enjoyed a practical monopoly, is not, however, the only source of this valuable fertilizer. Alsace possesses enormous deposits hitherto unworked owing to the monopoly Stassfurth had been able to secure from the German Government.

In our issue of March, 1915, we referred to the hopes of French agricultural authorities that Alsatian potash would be made available as soon as France recovered her lost provinces. The sanguine hopes then expressed have at last been realized, and Alsatian potash is no longer a dream, but a reality.

An official note which appeared in French agricultural periodicals in January last informs French agriculturists that after this date they can, without administrative formalities, obtain Alsatian potash manures, either direct or through their usual suppliers, who would transmit their orders to the Provisional Selling Bureau recently established at Melbourne.

Owing to transport difficulties, orders are only being received for truck loads, prices being as follows, in bulk (not bagged):—

Kainit, containing 12 to 15 per cent. of potash (K_2O), 21 centimes the potash unit. Say, for kainit containing 13.5 of potash, $0.21 \times 13.5 = 2$ fr. 85 the 100 kg., *i.e.*, not quite 24s. per French ton.*

Manure Salts (*Sels d'Engrais*) at 20-22 per cent. potash, 265 millimes the potash unit. Say, for a salt containing 21 of

* The French ton is equivalent to 2,199 lbs. avoirdupoids, or only 41 lbs. lighter than our ton

potash, 21 × 0.265 = 5.55 per 100 kg. (= 44s. 5d. per French ton).

Potassium Chloride, @ 50 to 60 per cent. of potash (K_2O), 375 millimes per unit. Say, for a chloride containing 55 of potash, 55 × 0.375 = 20.65 fr. per 100 kg. = £8 5s. 3d. per French ton.

Details follows as to orders, delivery, &c.

Happily, France is now no longer dependent on German (Stassfurth) potash. She has practically inexhaustible supplies within her new borders. Let us hope that Alsatian potash will ere long be available in the Commonwealth. The low prices mentioned above cannot fail to appeal strongly to vine-growers and orchardists who recognise the high value of this fertilizer.

POTASH MANURES—SULPHATE OR MURIATE?

By F. de Castella, Government Viticulturist.

The superiority of sulphate of potash over the chloride, or, as it is still often termed, muriate, is generally admitted; a contention which received forcible support from a recent article by Professor Degrully,* of Montpellier (France), criticising the form in which Alsatian potash is being made available for French agriculturists (*see* preceding note). He points out the inferiority of kainit and chloride of potash, as compared with nitrate, carbonate, or sulphate, stating that it is under either of the last three forms that potash gives the best results in the majority of soils.

He quotes an article by M. Lagatu, which appeared in *Progrès Agricole* in 1901, in which attention was very forcibly drawn to the inferiority of the chloride. Professor Lagatu, indeed, goes so far as to assert that in certain cases potash chloride, as well as kainit (in which potash sulphate is mixed with a large proportion of various chlorides) can even be positively injurious. It is largely a question of rainfall.

"In free limey soil, potash chloride, which is as good as the other potassic manures in the case of medium or heavy rainfall, is *harmful* if little or no rain should fall. . . . . Chlorides react on the lime contained in the soil, forming calcium chloride, a salt injurious to plant life, and especially so to nitrifying bacteria. Being soluble, heavy rain removes this salt from friable, well drained land . . . . but if the rainfall be deficient it remains in the soil to the detriment of the plant."

In the case of stiffer limey soil, he is even more emphatic. "Chloride by hindering nitrification, which is usually unsatisfactory in a stiff soil, should be altogether avoided. In all stiff soils it is not a manure, but a poison. Potash sulphate presents no danger. It even favours nitrification." He further points out that in very free soils, where, owing to its great solubility, the calcium chloride is readily removed by the easy circulation of rainwater, no injurious chloride remains; but should drought supervene, it will again cause damage.

Professor Degrully also quotes from a letter by M. Octave Audebert, President of the Agricultural Society of Gironde, to the French Minister of Agriculture, protesting against the potash salts recently made

* *Progrès Agricole*, 19th Jan., 1919.

available, and emphasizing the point hitherto insufficiently recognised, but confirmed by his long experience with agricultural manures—

"That, of the two potash salts furnished by the Rhine mines, the sulphate alone should be supplied to agriculture, the chloride being reserved for industrial purposes, more especially for the manufacture of potassium nitrate." He admits that "Germany has in the past mainly supplied us with chloride, reserving the sulphate for her own crops." He expresses his conviction that "the more general use of potash in the soils of our country is capable of bringing about an enormous increase in the yield of all crops, but on the express condition that it be supplied in the form of sulphate, the one to which all plants accommodate themselves best; this is particularly so in the case of the vine."

Professor Degrully points out that neither Alsace nor Stassfurth supply pure potash sulphate—it must be manufactured from kainite or chloride; from the latter by treatment with sulphuric acid, or by the reaction of sodium sulphate on potash chloride. In conclusion, he points out that the value of potassic manures has often been questioned by practical men—no doubt, in some soils, naturally rich in potash, the addition of this element may not materially affect the yield—but, as he pertinently asks, "May not many failures be due to the injurious action of the chloride?"

The views quoted above will, no doubt, be read with interest, since many of our vineyards are planted on fairly stiff soils in districts of only moderate rainfall. Where irrigation is possible, conditions are no longer quite the same, but it must be remembered that in several of our northern irrigation areas seepage has occasionally to be reckoned with. To use potash chloride in a soil over rich in salt (sodium chloride), thereby still further increasing the already excessive chlorine content, is, to say the least, illogical; under such conditions the superiority of the sulphate over the chloride form of potash is likely to make itself strongly felt.

THE FLAX INDUSTRY.

At the meeting of the Federal Flax Industry Committee on the 28th April, presided over by the Director of Agriculture (Dr. S. S. Cameron), very encouraging reports were received regarding the acreage to be planted this season. The committee was assured of a sowing of 3,000 acres, as against 1,400 acres last year. The districts from which the assurances have been given include Drouin, Warragul, Dalmore, Traralgon, and Sale. Hitherto, Drouin and Warragul have been regarded as the only flax centres. The committee considers that, in view of the fact that the Federal guarantee of £5 a ton for flax has been increased to £6, farmers should readily take up the crop. There is ample time for sowing, and the selected seed may be obtained through the committee at 12s. 6d. a bushel. While the best crops harvested last year were from early sown areas, very satisfactory yields were cut on areas sown in May and June, and some as late as August.

As a result of representations by the committee, the Federal Government has agreed to provide £1,000 for experimental work in connexion with the flax industry in all States. The experiments will be in the direction of ascertaining the most suitable seed and localities for the production of both fibre and linseed. The various State Departments of Agriculture are co-operating with the committee. Arrangements are being made with farmers for the setting aside of experimental plots.

THE LITCHI.

By J. W. Audas, F.L.S., F.R.M.S., Assistant, National Herbarium, Melbourne.

Litchi or Lee-chee (*Nephelium Lit-chi*) is one of the most delicious of all Chinese fruits. The tree which produces it belongs to the natural order Sapindaceæ, and is grown in the Southern Provinces of China and in the Northern Province of Cochin-China, where it has been in cultivation for possibly 2,000 years. It is also cultivated in the West Indies, and has been grown in Florida. There are several varieties, but the commonest is that producing fruit nearly round, about 1½ inches in diameter, with a thin, brittle shell of a red colour when ripe, covered all over with rough, wart-like protuberances. Though the litchi is essentially a tropical and sub-tropical tree, and does not adapt itself readily to climates differing widely from that of its original home, consequently it is more likely to be successfully grown in Queensland than in Victoria, but some litchi trees have been successfully grown by Chinese in this State, and have fruited well. It appears, therefore, that attention should be given to the cultivation of the tree in those parts of Victoria where the climate is found to be suitable.

The litchi is a handsome evergreen tree growing from 15 to 20 feet high, with alternate pinnate leaves about 3 inches long, and of a thick leathery texture. The flowers are arranged in axillary and terminal slender panicles. These are succeeded by fruit of a globular prickly nature, of which the edible portion is a sweet, semi-transparent, jelly-like pulp, or aril covering the seed.

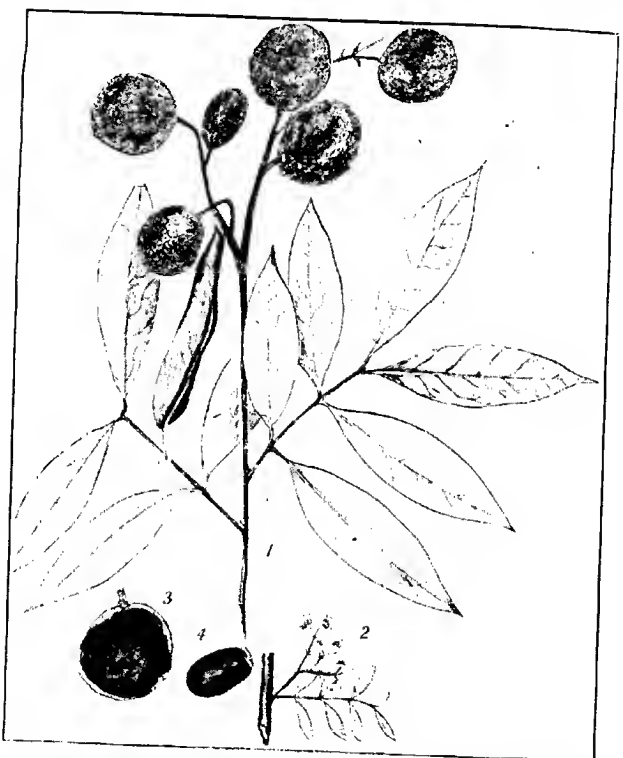
The Chinese dry the fruit, which then becomes blackish, and in that state large quantities are annually imported into Australia. The fruit is also sold in China in glass jars. Although they are naturally inferior to the fresh fruit, they still preserve some of their rich flavour. The fruit is preserved by simply drying it, and it is stated by an authority that "the Chinese use it in their tea, to which it communicates its fine sub-acid flavour, which is preferred to the sweetness of sugar." Another authority says—"In the lower Provinces of India it is almost co-extensively cultivated with the mango. It comes into season a little before that fruit, and in the larger cities, such as Calcutta, is sold in every fruit-dealer's shop, the streets for a month or six weeks being literally bestrewn with the rind and large seeds rejected by the wayside consumers." The fruit to be fully appreciated must, however, be eaten as soon after being picked as possible.

AUSTRALIAN SPECIES.

There are about thirteen species of Nephelium native to Australia, all of which are found in the eastern portion of the continent. One species, *Nephelium leiocarpum*, is indigenous as far south as East Gippsland. They are mostly trees of from 20 to 60 feet high. Some of them are highly ornamental, and are well worth cultivation in parks and gardens in suitable districts.

SITUATION FOR THE LITCHI.

The litchi ought to succeed in some of the warm sheltered parts this State. Whatever site is chosen should have a north-easterly aspect, sheltered from the cold, south, and westerly winds. Nothing harms the tree so much as exposure to inclement weather. It thrives best in a rather humid atmosphere, and where it will not have to endure the excesses of heat or cold.



1. Fruiting Branch. 2. Panicle of Flowers. 3. Fruit, with a part of the outer shell removed. 4. Seed.

SOIL.

This tree appears to succeed best on a rather strong, deep soil that is fairly rich in humus. Whatever soil the plant is grown on should be of a good depth, friable, and, if the natural drainage is unsatisfactory, artificial drainage will be required, for, should the roots get into a badly drained subsoil, the tree will soon become unhealthy.

PROPAGATION.

The litchi can be propagated by seed and by grafting. The seeds should be sown as soon as they are ripe in order to insure a large percentage of germination. They should be sown in earthenware pots, or shallow, wooden boxes, in the bottom of which has been placed a layer of rough pieces of charcoal. Over this spread a fold of half-decayed leaves, and then fill the pot or box to within an inch of the rim with rather sandy loam, which should be pressed down firmly. Sow the seeds thinly and evenly, covering them lightly with soil, and set the pots or boxes on rough ashes in a warm situation. When the seedlings appear, it is essential that they be watered very carefully. They will require protection during the first winter of their existence. If a glass house or frame is not available, some temporary shelter must be provided. In the succeeding spring, the young plants will be large enough to be transferred singly to pots, and with ordinary attention they should be ready for transplanting to their permanent positions twelve months later. If only a few seeds are being sown, they may be placed singly in small, well-drained pots, and when the seedlings are well established they may be transferred to larger ones, finally planting them out when the proper season arrives.

To perpetuate any variety true to type, propagation by layering is necessary. Layers should be put down in spring, before the new growth commences. With ordinary care and attention in the way of watering, &c., the layers will be sufficiently rooted by early autumn or in the following spring to be transferred to their permanent positions. Branches that cannot be brought down to the ground may be layered in extemporized wooden boxes filled with soil and placed on raised platforms. Layers treated in this way should be watered regularly in warm weather. Where a number of trees are to be planted, they should be set out similarly to other fruit-bearing trees. It will take about 100 trees to plant an acre. Each tree should be carefully planted, tied to a stake, and mulched. For a few years after the trees are planted, dwarf-growing crops, such as potatoes, &c., could be raised between the rows. The only cultivation required for the trees will be to keep the weeds down and the soil well loosened with a hoe or light scarifier. Very little pruning will be necessary beyond maintaining a well-balanced head and a clean stem for a few feet above the ground, and the removal of all weak branches and those that override each other.

RICH MILK IN CHEESE-MAKING.*

It is due to the present high prices realized for all classes of cheese, as compared with its equivalent in the form of butter, even in whole milk-producing districts, that considerably more cheese is being made

* Reprinted from *The New Zealand Dairyman*, 19th January, 1918.

than in normal times, particularly those of the quick-ripening variety. The blue-veined varieties, such as Stilton and Wensleydale, cannot be regarded as so profitable to make as the hard-pressed varieties, like Cheddar and Cheshires. When one considers that 1 lb. of ordinary cheese may be produced from 1 gallon of milk, and that it will require 2¼ gallons of similar milk to make 1 lb. of butter, it is surprising that so much butter is made, except where a large number of calves are to be reared on skimmed milk.

It has always been recognised that the Ayrshire is a typical type of animal for cheese-making, and while other breeds like the Shorthorn, the milk of which is equally low in butter-fat, are also suited for this purpose, cheese-makers are apt to think that the use of rich milk in cheese-making amounts to so much waste. There was, however, a very interesting collection of cheeses exhibited at the Highland Agricultural Show when held at Glasgow many years ago, and these cheeses were made from milk containing varying percentages of butter-fat, from 2 per cent. upwards, and the difference in size, and quantity *versus* quality in the milk yield of the cow is always a matter of importance to the farmer, and we all know how difficult it is to combine both. Fortunately, cheese-making is now more profitably conducted, and those who have turned their energies in this direction are only too eager and interested to study anything bearing on this industry in which they are employed. Where this matter of rich milk has been put to the test, it is found that not only does the richer milk produce cheeses of higher quality, but of greater weight, and very different to the more ordinary Cheddars, for example, made from average quality shorthorn milk containing 3.5 per cent. or thereabouts of butter-fat. The percentage of casein in milk bears a practically uniform relation to the percentage of fat. Thus milk which is rich in fat is usually rich in casein. It is important to notice that where the milk employed in making cheese is rich, the percentage of fat lost in the process of manufacture, and which passes into the whey, is smaller than where the milk used is poor in fat. When cheese was made from rich and poor milk respectively for a period of fifteen days, the milk of the Shorthorns, which contained a low percentage of fat, produced 1 lb. of cheese from 11.3 lbs. of milk, whereas the milk from the Jersey cows required to make 1 lb. of cheese was only 8.1 lbs. Again, to quote another instance, in which milk containing 4.5 per cent. of fat was used, the average yield of cheese per 100 lbs. of milk was 12.35 lbs., or a fraction more than 8 lbs. of milk to each 1 lb. of cheese. It is worthy to remark that where rich milk is used, the proportion of water present in the cheese is greater than where poor milk is used. Thus, with an increase of fat in the milk, there is an increase in the water content of the cheese, and consequently in its weight. For this reason cheese made from rich milk gains weight from three sources—from the increased quantity of casein, the increased weight of fat, and, lastly, the increased quantity of water. It is well known to cheese-makers that the solid matter of milk which finds its way into the cheese consists almost entirely of fat and casein, and yet the solid matter lost or carried off in the whey is practically equal to the solids which have been removed in the curd. Thus, in referring to most reliable records, we find that the total weight of solids

in the cheeses for each pound of solids in the whey varied from 0.9 lbs. in April to slightly more than 1 lb. in September, there being a graduál increase from month to month.

In every case, the weight of the solids in the cheese rose from 0.93 lbs. in April to 1-16 lbs. in October, an increase practically made throughout the whole period. In all the most important cheese-making districts the fat is skimmed from the whey and converted into butter. This is especially the case in Cheshire, and whoever the cheese-maker may be, it is practically impossible to prevent the occurrence of this loss. Under the best conditions the weight of fat lost in the whey per 100 lbs. of milk employed varies from 0.35 to 0.4 in April, rising and falling as the months proceed, the loss of fat being smallest in the month of June. On the other hand, the weight of casein which passes into the whey gradually increases from the beginning of the cheese-making season until the end. In one instance, the loss in April was 0.64 lbs., and in October 0.85 lbs., although in this case there was no systematic increase. The actual quantity of the solid matter of the milk which is recovered reaching 50 per cent., and of casein 75 per cent.

It may be well to compare the results obtained by the employment of milk of varied quality. When the milk contains from 3 to 3.5 per cent. of fat, the percentage lost in the whey reaches 9.5, while the weight of the cheese made per 100 lbs. of milk slightly exceeds 9 lbs. When the fat reaches 3.5 to 4 per cent., the loss of fat falls to 8.3 per cent., while the cheese made per 100 lbs., or 10 gallons of milk, reaches 10 lbs. With each step forward in the richness of the milk there is an unvarying diminution in the loss of fat and an increase in the weight of the cheese. Thus, when the milk contained 5 per cent. of fat, the loss of fat in the whey was reduced to 6 per cent., while the weight of the cheese reached 13½ lbs. per 100 lbs. of milk, showing practically an increase of 50 per cent. On this basis, it is surely worth the while of cheese-makers to employ rich milkers, inasmuch as they make gains from two sources; the loss of fat is smaller, and the weight of the cheese is larger, while we may add a third reason which we have found in the increased quality of the cheese, both from the point of view of flavour and mellowness or creamy consistency. It is only to add that where cheese is made upon a farm by a skilled maker, where control of the whole process is perfect, there may be, and, indeed, there should be, a diminution in the loss of fat from poor milk, and consequently a slight increase in the weight of cheese produced.

The greatest loss occurs where cheese is factory made, and where, in spite of a fair quality of the milk, the process of manufacture is under less control than in the case of a private dairy. It is usual in good dairies to weigh the curd before it is placed in the cheese vat for the press. An indication of the actual weight of the ripe cheeses may be obtained by deducting 9 per cent. from the weight of the curd. In comparing the loss of fat which occurred in the manufacture of Cheddar cheese at different places, it was found that the percentage of loss varied from 6.3 where rich milk was used, to 10 where the milk was of average quality, containing 12.6 per cent. of solids. Where the weight of fat per lb. of casein in the milk was greatest, there was the least loss of fat, but in all cases the loss of solids in the whey was approximately close.

RUTHERGLEN STATE FARM.

The State Farm at Rutherglen consists of 1,100 acres, of which 100 acres are laid out in experimental plots. The average rainfall for the district is 21 inches.

The farm manager, Mr. P. P. O'Keefe, in his report for May, states that though the summer and autumn months have been exceedingly dry at Rutherglen, the weather during the month has been especially favorable for grass and for early-sown crops. Two inches of rain have been recorded, and seeding is proceeding smoothly.

Up to the present 460 acres have been sown, and the crop is all above ground. The 190 acres sown to oats is particularly forward, and is carrying three sheep to the acre. These early-sown crops are regarded by the farm manager as a boon, as on them the ewes can be carried right through the lambing season until the spring-sown crops of rape and millet are fit to feed off.

In addition to the oats, 250 acres of wheat and 20 acres of barley have been sown. A further 40 acres is now being sown to barley, while 20 acres is being prepared for peas. Included in the wheat are the following areas of seed wheat:—

	Acres.
Federation	110
Yandilla King	20
Currawa	20
Gallipoli	10
Gluyas	10
Major	8
Warden	22
Penny	20
Marshall's No. 3	14
King's Early	10
College King	10

In pursuance of the policy of carrying the maximum head of stock, a paddock of 90 acres will be fallowed up and sown to millet in the spring. It is also intended to plough up and sow 100 acres to rape, which should furnish useful grazing for sheep during the summer.

It is noticed at Rutherglen that the spring-sown rape is much more successful than that sown in the autumn; indeed, very little success has been achieved with the latter.

The dairy herd is at present grazing oat crops, but milk yields are now falling off. The young cattle are doing well, the grass being supplemented by green oat crops and ensilage.

The crossbred flock of 300 ewes, which were joined with two-tooth Border Leicester, are expected to lamb towards the end of June. As the ewes are of a good, roomy type, and are doing well on the oat crops, it is expected that the progeny will be good quality lambs. The 170 weaners, which were carried forward on forage crops, planted in the spring, have proved good property, and will be disposed of after being topped up on oat crops.

There are 53 pigs on hand. Wheat screenings from the grader forms the bulk of their feed at present. Two acres of Algerian oats have been sown for their use, and 3 acres, each of peas and barley, will be sown for forage to supplement the hand feeding. A trial plot of artichokes, as forage for pigs, will be planted in the spring.

Additions to the present sties are contemplated, so that feeding tests with pigs can be carried out.

The grass paddocks are now being spelled, and will be top-dressed with 1 cwt. super. per acre. This has been proved a profitable practice on the 4-acre experimental plots during the past four years. A paddock of subterranean clover, and another of rye grass and clover, sown at the foot of the College hill continues to give a satisfactory return. The results show what can be done with artificial grasses to improve the carrying capacity of small paddocks in favoured situations—even on the rainfall received at Rutherglen. A loamy paddock of 13 acres is being subsoiled for lucerne. Crops of this plant have, without irrigation, given fair yields in picked situations in other parts of the district, and provide a useful green pick for stock during the summer.

FLUE CURING LEMON BRIGHT TOBACCO LEAF.

In May, 1916, the Department of Agriculture made an agreement with Messrs. Rae Bros., of Gapsted, to carry out a series of experiments in tobacco culture, with a view to testing varieties of tobacco suitable for the production of lemon bright leaf, and the heavier types of plug tobacco leaf, and cigar leaf, for filler and wrapper purposes; also experiments in the treatment of the soil for the prevention of blue mould, the most serious disease affecting tobacco in Victoria.

Up to the time of these experiments no attempt had been made in this district to cure lemon bright leaf by the use of stoves and flues in a properly constructed barn, with the scientific regulation of temperatures and ventilation. The season, owing to exceptional wet weather, proved very unsuitable for the crop, but sufficient tobacco was produced to test the various experiments.

In March, 1917, a portion of an old tobacco shed was fitted up by the Agricultural Department, as designed by the then Tobacco Expert (Mr. Temple A. J. Smith), the sides being walled with iron outside and lined inside with paroid, with vents through which currents of air could be regulated left in each wall at both top and bottom. The roof was also ceiled, and a ventilator provided in the top.

Two stoves, 4 ft. 6 in. long by 2 feet by 18 inches, were made to order by Messrs. Cochrane and Scott, and iron flues, 10 inches in diameter, connected with the stoves, and run through the building, 4 feet apart, the smoke being taken out through smoke stacks of iron. Steam pans were used to regulate humidity. The fuel used was wood.

On the suggestion of Mr. J. Gilmour, tobacco buyer, Mr. Tregenna, the tobacco expert of New South Wales, was invited to attend the first cure, and was present for two days.

The first barn was started on the 17th April, 1917, at 9 p.m., and finished at 1 p.m. on the 22nd April, a period of four and a half days in all. Two barns of leaf were cured, and the result was very satisfactory, the leaf being pronounced the best of its type produced in Victoria.

Messrs. Sniders and Abrahams were the purchasers at 2s. per lb., the British-Australasian Tobacco Company's offer being 1s. 9d. per lb.

The whole operation was carried out by the Departmental Tobacco Expert (Mr. Temple A. J. Smith), with the assistance of Messrs. Rae Bros.

The varieties giving best results were spotted gum and yellow pryor, but all the varieties treated were very superior to the same tobaccoes cured under the ordinary systems.

EXPERIMENTS IN THE CONTROL OF ST. JOHN'S WORT.

By H. W. Davey, F.E.S.

During the last twelve months, in which I have been more or less engaged in conducting experiments for the control of St. John's wort, I have had many opportunities to observe some interesting facts relating to this plant. The one thing that stands out above all others is that rabbit suppression and the control of St. John's wort are inseparable, especially in the Alpine areas.

St. John's wort is not the smothering plant it is usually supposed, but is largely assisted by the rabbit in suppressing other herbage. Even in the worst weed-infested country, grass or its seeds always appear to be present, although usually in a weakly or dormant condition. This can be proved by an inspection of the country at Bright, recently swept by bush fires, where grasses are now* springing up, and if it were not for the presence of the rabbit, would ultimately crowd out the introduced St. John's wort. These grasses are much quicker growers during the autumn than the pest weed, and would soon establish themselves and compete with it for space if the rabbits did not eat them down and often entirely destroy them.

Some most interesting examples of weed control by grasses are to be seen at Bright. The wort thrives best under occasional cultivations (providing, of course, that these are not frequent enough to prevent leaf formation), for after the soil has been disturbed, weakly plants quickly show great vigour. The land on which St. John's wort was first introduced on the Harrietville-road was always noted for the luxuriant crop of weed it carried. Some years since, a portion of this land was fenced and made rabbit proof, and part of it has been planted with walnut trees. The planted area is still heavily infested, a result of the cultivation; but on the higher land, which is unplanted, kangaroo grass has made wonderful progress at the expense of the weed, which is fast disappearing.

The old Bright Race-course has long been heavily infested, and many people still call St. John's wort the "race-course weed." This land affords another example of grass controlling the plant. It was dredged for gold, and later, when taken over by the Forests Department, was made rabbit-proof and planted with *Pinus insignis*. The plantation now carries some fine patches of grass, and here and there the wort has been already crowded out.

The pine plantation at Morgan's Creek affords yet another example. Splendid grass occurs here also, and in many places the weed has quite disappeared, or is so small and weak that it has to be carefully looked for.

In the examples mentioned, nothing has been done to assist the grass except to keep the rabbits away, and if they were absent from adjacent Crown lands I feel confident that grass could control the weed. This would be especially so if some seed were sown at intervals, as then quicker results would be obtained than, as at present, by waiting for the natural grass to recover after the years of ill-treatment it has received from the rabbit.

* These notes were written 23rd April, 1919.

The enormous areas of remote mountainous country infested with St. John's wort makes the use of chemicals impossible, as well as prohibitive, owing to cost.

The experiments now being made with chemicals have already demonstrated their efficacy for quickly ridding land of noxious weeds. While, however, they are of undoubted value in settled country, or in dealing with infested areas adjacent to occupied country, and particularly where transport is good, their general use can never be looked for in the steep broken country on both the Murray and Gippsland slopes of the Australian Alps. And it is here that an organized crusade against the rabbit would prove of great value, and go more towards solving the problem of stopping the onward march of St. John's wort than any other proposal likely to be put forward. Every fire that sweeps through these mountains checks the weed temporarily, and at the same time encourages the grasses. Fire does not appear to injure the root system of the wort at all, but it causes immense destruction of its seeds, as, owing to the woody flower stems and the resinous nature of the seed capsules, they burn very fiercely. The seed is very late in shedding, so that every bush fire destroys most of it, and the number of seeds shed annually is enormous—I have counted 15,000 seeds, the product of one plant.

The high plains of the Australian Alps are important as a stand-by for stock in years of drought, and this makes the freedom of the foothills from noxious weeds of great importance. Travelling cattle from the high plains pass along these mountain roads, some of which are badly infested with St. John's wort, and they must collect some of the seed in passing. The introduction of so much of the weed into New South Wales is probably due to stock returning from these infested areas.

An inspection of the plots previously referred to suggests that there is a good opportunity for carrying out research work, not only as a means for solving a problem of such national importance as the eradication of St. John's wort, but also for the improvement of the stock-carrying capacity of the mountain country to something like the value it had before the rabbit made its appearance.

There are several grasses that are able to successfully crowd out St. John's wort, providing the ground is not disturbed in any way, and that protection is afforded from rabbits.

The grasses that are doing such excellent work at Bright are *Paspalum dilatatum*, *Setaria nigrirostris*, and kangaroo grass (*Anthistiria imberbis*). There are others that deserve a trial, the most promising of which are probably wallaby grass (*Danthonia semi-annularis* and *pilosa*), couch grass (*Cynodon dact*), rye grass (*Lolium*), and, for the higher altitudes, *Phalaris commutata* or *P. canariensis* (canary seed) would be worth a trial.

TREATMENT OF PREGNANT ANIMALS.

Periods of pregnancy are unquestionably the most important time in the life of a breeding animal, and the very best attention should be given during such times, for the proper care of the mother animal and the unborn young has a decided effect on the offspring after birth. Cows are often subject to rather poor treatment, for, through ignorance

or a desire for gain, many people reduce the feed of their cows by one-half to two-thirds during the dry period. This is quite a serious mistake, however, for it should be remembered that at this time food is needed for a double purpose, just the same as when giving milk. It never pays to stint the feed of pregnant animals in an effort to economize during a time when they are not actually producing visible results.

This is particularly true of milk cows, if one expects to get a reasonable flow of milk after calving. A cow that has had her feed reduced for several months before calving will have drawn on her reserve force to keep the feeding of the unborn calf up to normal, consequently she comes to the milking period in a badly run-down condition, very often having a milk flow that is not sufficient even for the calf. In such cases the cow proves unprofitable as a milk producer, due simply to poor management, but the owner, thinking she has passed her useful stage, disposes of her at once.

All pregnant animals should be given a diet that is nourishing, not too bulky, and easily digested. Fat has a decided tendency to make an animal sluggish and inactive, something that must be avoided during pregnancy. It is very essential to the health of both the mother and the young that all organs of the body properly perform their functions, and when out of order they should be corrected at once. If some of these precautions were taken there would be less loss in live stock. Kindness in caring for all stock is a factor that results in profit, and animals that are always gently handled come to regard the one who cares for them as a friend, and his presence does not excite or frighten them. This is very valuable when the young things are being born and assistance is necessary. If animals have learned from past care to regard the attendant with fear, the mother instinct will prompt them to resent any attention from him. When animals trust their attendant, his presence may save many of the young things that would otherwise perish. Sheep are very easily excited, and gentleness is especially valuable in handling them. Sudden fright causes sheep to rush together, very often causing serious injury. Pregnant animals of all kinds should be kept as quiet as possible to prevent injury from kicking, crowding, or being stepped on.

—*Auckland Weekly News.*

FRUIT CASE WOODS.

Experiments have been conducted recently by the New South Wales Department of Agriculture in the use of the common willow for fruit cases. The New South Wales fruit expert and irrigationist (Mr. W. J. Allen) expresses the opinion that there are good prospects of supplying much of the requirements of the trade in this way. The willow thrives on the banks of most of the rivers. The wood possesses the much-desired elasticity for the tops and bottoms of the cases, but is too valuable for the ends, which have to be much thicker. The ordinary pine (*Pinus insignis*) is suitable in many respects, but is not so elastic. It does well on the coast, where it is often used as a breakwind for orchards.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

PLANTING.

The time has now arrived for the general planting of deciduous fruit trees. The soil should have previously been well ploughed and subsoiled, and, as far as possible, drained. To ensure satisfactory results, it is essential that the orchard be subsoiled. Where expense is a consideration, drainage may be left for subsequent years, but once the orchard has been planted, it will be impossible to subsoil.

When planting out, the distance between the trees will be determined by the kinds to be planted. For ordinary deciduous fruiting trees it is the custom in this State to plant them 20 feet apart in the rows, the rows also being 20 feet apart. Results have proved this to be a satisfactory practice. Almond trees may be planted 15 or 16 feet apart each way, while walnuts, owing to their spreading habit, require a distance of 30 feet.

Deep planting is not advocated, the general practice being that the depth of planting in the nursery should be followed. If holes be dug, they should be shallow, the bottom being merely loosened to allow a comfortable friable bed for the tree roots. A good practice is to dig the whole strip along which the trees are to be planted, merely removing sufficient soil afterwards when planting. Another satisfactory custom is to plough furrows 20 feet apart, and to plant the trees in the furrows, filling in the soil over the roots and trampling well down.

Before planting, the roots of the young trees should be well trimmed, shaped to an even form, and cleanly cut. As the result of their removal from the nursery beds, the roots are generally more or less damaged, and numbers of the fibrous roots, becoming dry, shrivel and die. These all require a clean trimming. Then it is often desirable to remove some of the roots so as to balance the root system. The trimming of the roots gives the young tree a clean root system, and it is enabled to establish itself with young, vigorous roots.

After planting, the top should be well cut back, so as to leave three or four arms, with three or four buds on each. Where it is not possible to have this number of arms or limbs it is frequently advisable to cut back to one stem, allowing the buds to break out strongly and frame the tree after planting. In some countries, the custom of not cutting back the trees the first year is favoured. Local experience has not resulted in favour of this practice, as it is found to be inadvisable to unduly strain the young tree by leaving a heavy top to be supported by the weak-growing root system.

A number of good commercial fruits have been found to be either wholly or partially self-sterile, requiring other varieties near them to enable them to set their fruit. For this purpose it is necessary that the bloom periods should be somewhat coincident.

SPRAYING.

Spraying should now be done to combat scale insects, woolly aphis, and bryobia mite. Any oily emulsion, or the lime-sulphur spray, may be used, and for woolly aphis it will be necessary to apply the spray

with considerable pressure, so that the liquid may penetrate the glossy covering of the aphis.

GENERAL WORK.

All ploughing should now be completed; if not, it should be finished before spraying and pruning operations are proceeded with.

Any autumn manuring or liming should also be now carried out. This, too, should be finished before spraying or pruning. Before spraying with oils or with lime sulphur wash, all rough bark on apple and pear trees should be scraped off. This will mean the certain destruction of any codlin moth larvæ hiding underneath.

The Vegetable Garden.

If not previously done, asparagus beds should be well cleaned out, and a top dressing of manure given. To insure good drainage, the soil from the paths, or between the beds, may be thrown up on the beds, so as to deepen the surface drainage, and to consequently warm the beds. This will mean earlier growths. A heavy dressing of manure should be given, and the beds well and roughly dug over.

Plant out seeds of tomatoes and the pumpkin family in the frames; and sow in the open, seeds of peas, lettuce, spinach, broad beans, radish, onions, carrot and leek. Asparagus crowns, rhubarb roots, tubers of Jerusalem artichokes, shallots and onions may now be planted out. Celery should still be earthed up, taking care not to have the beds too wet.

The Flower Garden.

General cleaning up and digging will be the work for this month in flower section and shubbery. Where the soil is heavy or sour, or where sorrel is plentiful, the garden should be given a heavy dressing of fresh lime, a fair dusting being applied all over the surface. Lime should not be used in conjunction with leaves, garden *débris*, leaf-mould, stable manure, or any other organic matter used for humus. These should be first disposed of by digging well into the soil; then shortly afterwards a top dressing of lime may be given. Should no humic material be used, the lime may be dug in with the autumn digging.

In cleaning up gardens, all light litter and foliage should be either dug in, or, better still, it should be placed in an out-of-the-way corner to form a compost heap. Leaf-mould, well rotted, is especially useful in any garden, particularly where such plants as Azaleas, Rhododendrons, Liliums, &c., are grown, or for pot plant work it is exceedingly valuable. In forming the compost heap, no medium whatever should be added to help the rotting down of the leaves unless it be a little sand. Any chemical added will render the mould unsuitable for its special objects.

Any hardy annuals may be planted out, such as stocks, pansies, wallflowers, &c., and cuttings of roses and hardwood shrubs may also be planted. In planting out cuttings it is very important that all the eyes should be removed from the part of the cutting which is to be below the ground. If this be not done, there will always be the subsequent danger of the plant suckering.

Roses and any summer and autumn flowering shrubs that have finished flowering may be pruned. If the spring flowering shrubs have not previously been pruned, they should be allowed to remain until after the next flowering season. This especially applies to such plants as Spireas. Philadelphus (Mock Orange), Deutzia, Prunus Mume, and other early flowering shrubs. To prune these now would mean the certain loss of a great proportion of their flowers.

In pruning, the shrubs may be well thinned out, especially removing any weak upright or old flowering growths; keep the shrub always at an outward growth, inclining to a broad bushy type, instead of to an upright habit. By this means, the lower regions will always be furnished with good growth. Shrubs and trees of all descriptions should never be allowed to become too crowded; they require to be opened, so as to allow sunlight and air into the interior, where it is most needed. This is one means by which this class of plants may be kept healthy and free from disease. Very few shrubs resent pruning, and the majority of them, including Australian shrubs, such as Acacias, are very amenable to the pruning knife.

In rose pruning, the rule is that strong growing plants require less severe cutting than the weak growing ones. As roses always flower on new wood, it is essential that the bushes be pruned regularly if good blooms are desired. All weak growths, exhausted and worn out wood must be removed, retaining only vigorous growths. It is generally advisable to always prune to four or five eyes or buds, so as to have subsequent strong growths, always pruning into the previous season's wood. Spindly growths, especially in the centres of the bushes, should be removed, the plants being trained with an open and angular habit.

To prevent loss by decay, it will be advisable to lift and store such herbaceous plants as delphiniums, perennial phlox, rudbeckias, &c., also dahlias, tubers, chrysanthemums, cannas, and perennial sunflowers and asters. Failing the possibility of doing this, they should be lifted gently with a fork, so as to allow of a slight air space under the crown.

REMINDERS FOR JULY.

LIVE STOCK.

HORSES.—Those stabled and worked regularly should be fed liberally. Those doing fast or heavy work should be clipped; if not wholly, then trace high. Those not rugged on coming into the stable at night should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Old horses and weaned foals should be given crushed oats. Horses at grass will greatly benefit by the addition of either hay or chaff, oats and bran. A lick, previously recommended, should be available for all horses at grass. Old and badly-conditioned horses should be given some boiled barley or linseed. Mares now approaching foaling will require careful attention, and should be kept under constant observation. It is not advisable to have mares fat at foaling time, nor is it wise to have them poor; they should, however, be kept in good working condition. The practice of working mares in shafts until they are about to

foal is strongly condemned, as such a course may give rise to many foaling ailments, with consequent loss of foals, and, at times, that of mares also. Commence preparing stallion for season, especially if worked.

CATTLE.—Cows, if not housed, should be rugged. Rugs should be removed and aired in the daytime when the shade temperature reaches 60 degrees. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of the young grass. Cows about to calve, if over fat, should be put into a paddock in which the feed is not too abundant. Newly-calved cows should be fed liberally to stimulate milk flow. Cows may now be served for autumn calving. Calves should be provided with warm, dry shed.

PIGS.—Supply plenty of bedding in warm, well-ventilated styes. Keep styes clean and dry. Store pigs should be placed in fattening styes. Sows in fine weather should be given a grass run. The cheapest feed now available is second-grade wheat, to be obtained from the Wheat Board.

SHEEP.—Go carefully through all breeding flocks at conclusion of lambing. Reserve all best-framed and profitable-fleeced ewes. Ear mark all found undesirable to breed from, and dispose of any that may be fat before prices recede in the spring. Use a neat mark for ear-marking, not the "slash," "top off," and other oversized unsightly marks. Discard all undersized, narrow-framed ewes, any with short yellow fleeces, those with thin locky staple, any with very fine, light, and wasty fleeces, ewes with "bottle" udders, single teats, undershot, overshot, or otherwise deformed mouths, ewes six years old and over. Draw teeth of aged ewes altogether, if showing open and signs of feed slipping through. Consider well before selling any early born, good-fleeced ewe lambs. Select best rams for future service; remember, wide, thick sheep are best thrivers, but they must carry good fleeces as well. Keep all ewes well crutched and the udders and eyes well cleared of wool previous to lambing. Give lambing flocks good attention.

POULTRY.—Mating of birds intended for breeding purposes should receive immediate attention. Eight second-season Leghorns or any other light breeds, or six of the heavier birds, such as Orpingtons, Plymouth Rocks, and Wyandottes (preferably in their second year), with a vigorous unrelated cockerel will be found satisfactory. Table birds bred in March or April will pay handsomely prior to the Cup Carnival. A tonic in drinking water as a preventive against chicken pox and other ailments is advantageous.

CULTIVATION.

FARM.—Finish sowing barley, peas and beans, and late white oats in backward districts. Trim hedges. Fallow for potatoes, maize, and other summer crops; in early districts, plant potatoes. Graze off early crops where possible.

ORCHARD.—Continue to plant deciduous fruit trees, bush fruits, and strawberries. Continue cultivating and pruning. Spray for mites, aphides, and scales.

FLOWER GARDEN.—Plant shrubs, climbers, and permanent plants, including roses; also annuals and herbaceous perennials, early Gladioli, Liliums, Iris, and similar plants. Continue digging, manuring, trenching, and liming.

VEGETABLE GARDEN.—Plant out seedlings. Sow seeds of carrots, parsnips, cauliflowers, onions, peas, broad beans, and tomatoes. Dig all vacant plots.

VINEYARD.—Proceed with pruning, burning off, and ploughing. Though Anthracnose (black spot) did little or no damage last season, the disease must not be ignored; given suitable weather conditions and absence of preventive treatment, its re-appearance is almost certain. All susceptible varieties (sultanas, &c.), should be preventively "swabbed," just before the buds burst, with acid iron sulphate solution. Bulletin describing treatment will be posted on application. Complete, as early as possible, the application of manures if not already done. Mark out land for new plantations. If ground is in good order and not too wet, proceed with plantation of young vines (unpruned). Remove cuttings or scions from vines previously marked, and keep fresh by burying horizontally in almost dry sand in cool, sheltered place. Permanently stake or trellis last year's plantations.

Cellars.—Rack all young wines, whether previously racked or not. Rack older wines also. For this work choose, as much as possible, fine weather and high barometer. Fill up regularly all unfortified wines. This is a good time for bottling wine.